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Rev. 4

U.S. Department of Energy
Idaho Operations Office

Idaho National Laboratory Site Environmental Monitoring Plan

February 2014

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DOE Idaho Operations Office

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EXECUTIVE SUMMARY

The Idaho National Laboratory (INL) Site consists of nine major facilities located in southeastern Idaho within a U.S. Department of Energy (DOE) specified boundary and several laboratories and administrative buildings located in Idaho Falls, Idaho, approximately 48 km (30 mi) east of the INL Site boundary. This plan describes routine environmental compliance and surveillance monitoring of airborne and liquid effluents, and ecological and meteorological conditions on and in the vicinity of the INL Site.

Environmental monitoring discussed in this plan is conducted in accordance with DOE Order 458.1, *Radiation Protection of the Public and the Environment*[1]. The purpose of DOE Order 458.1 is to establish requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under the control of DOE pursuant to the Atomic Energy Act of 1954, as amended. The objectives of the order include 1) conducting DOE radiological activities so that exposure to members of the public is maintained within the dose limits established in the order, 2) controlling radiological clearance of DOE real and personal property, 3) ensuring that potential radiation exposures to members of the public are as low as reasonably achievable, 4) ensuring DOE sites have the capabilities, consistent with the types of radiological activities conducted, to monitor routine and non-routine radiological releases and to assess the radiation doses to members of the public, and 5) protecting the environment from the effects of radiation and radioactive material.

This plan includes the rationale for monitoring, the types of media monitored, where the monitoring is conducted, and information regarding access to analytical results. Environmental monitoring activities are conducted by a variety of organizations consisting of:

- Idaho National Laboratory
- Idaho Cleanup Project
- Environmental Surveillance, Education, and Research Program
- United States Geological Survey
- National Oceanic and Atmospheric Administration
- Advanced Mixed Waste Treatment Project.

Monitoring of airborne and liquid effluents is performed to verify compliance with permitting requirements, state and federal regulations, and environmental protection policies and commitments. Surveillance monitoring addressed in this document is driven by DOE order and is performed to characterize pre-operational conditions, detect, characterize, and respond to releases from site operations and activities, assess impacts, estimate dispersal patterns in the environment, characterize the exposures and doses to individuals and the population, and evaluate the potential impacts to biota in the vicinity of the release.

Nonroutine activities, such as special research studies and the characterization of individual sites for environmental restoration, are outside the scope of this plan. Environmental monitoring activities at Naval Reactors Facility

conducted by Bechtel Marine Propulsion Corporation are not included in this plan.

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CONTENTS

FIGURES

TABLES

ACRONYMS

AMWTP	Advanced Mixed Waste Treatment Project
ARLFRD	Air Resources Laboratory Field Research Division
ARP	Accelerated Retrieval Project
ASER	Annual Site Environmental Report
ASME	American Society of Mechanical Engineers
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance
BBS	Breeding Bird Survey
BLR	Big Lost River
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CITRC	Critical Infrastructure Test Range Complex
CFR	Code of Federal Regulations
CRMO	Cultural Resources Management Office
CRWG	Cultural Resources Working Group
CWI	CH2M-WG Idaho, LLC
DEQ	Idaho Department of Environmental Quality
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
ESRPA	Eastern Snake River Plain Aquifer
EBR	Experimental Breeder Reactor
EDE	effective dose equivalent
EMS	Environmental Management System
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESER	Environmental Surveillance, Education and Research (Program)
ES&S	Environmental Support and Services
GPRS	global positioning radiometric scanner
GSS	Gonzales-Stoller Surveillance
HSL	Health Services Laboratory
ICDF	Idaho CERCLA Disposal Facility
ICP	Idaho Cleanup Project
IDAPA	Idaho Administrative Procedures Act
IEMP	Idaho Environmental Monitoring Program

INEEL	Idaho National Engineering and Environmental Laboratory
INEL	Idaho National Engineering Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IRC	INL Research Center
ITG	Idaho Treatment Group, LLC
IWTU	Integrated Waste Treatment Unit
M&O	management and operating
MDIFF	mesoscale diffusion
MEI	maximally exposed individual
MFC	Materials and Fuels Complex
MSC	Monitoring and Surveillance Committee
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NRF	Naval Reactors Facility
OSLD	optically stimulated luminescent dosimeter
QA	quality assurance
R&D	research and development
RCRA	Resource Conservation and Recovery Act
REC	Research and Education Campus
RESL	Radiological and Environmental Sciences Laboratory
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
SMC	Specific Manufacturing Capability
STP	Sewage Treatment Plant
TAN	Test Area North
TLD	thermoluminescent dosimeter
USGS	United States Geological Survey
USGS-BRD	United States Geological Survey-Biological Resources Division
WAG	Waste Area Group
WIPP	Waste Isolation Pilot Plant
WNS	White-nose syndrome
WRP	Wastewater Reuse Permit
WRRTF	Water Reactor Research Test Facility

Idaho National Laboratory
Environmental Monitoring Plan

1. GENERAL INFORMATION

1.1 Purpose

This plan provides a high-level summary of environmental monitoring performed by various organizations within and around the Idaho National Laboratory (INL) Site as required by U.S. Department of Energy (DOE) Order 435.1, "Radioactive Waste Management"[3] and DOE Order 458.1, "Radiation Protection of the Public and the Environment"[1], Guide DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Surveillance"[4], and in accordance with 40 Code of Federal Regulations (CFR) 61, "National Emission Standards for Hazardous Air Pollutants"[5]. The purpose of these orders is to 1) implement sound stewardship practices that protect the air, water, land, and other natural and cultural resources that may be impacted by DOE operations, and 2) to establish standards and requirements for the operations of DOE and DOE contractors with respect to protection of the environment and members of the public against undue risk from radiation. This plan describes the organizations responsible for conducting environmental monitoring across the INL Site, the rationale for monitoring, the types of media being monitored, where the monitoring is conducted, and where monitoring results can be obtained.

Detailed monitoring procedures, program plans, or other governing documents used by contractors or agencies to implement requirements are referenced in this plan. This plan covers all planned monitoring and environmental surveillance. Nonroutine activities such as special research studies and characterization of individual sites for environmental restoration are outside the scope of this plan.

1.2 INL Site Description

The INL Site is approximately 230,500 hectares (890 mi^2) and is located on the Eastern Snake River Plain in southeastern Idaho (see Figure 1-1). It was established as a nuclear energy research and development (R&D) testing station in the late 1940s and was designated a National Environmental Research Park in 1975. All land within the Site is protected as an outdoor laboratory where the effects of energy development, industrial activities on the environment, and the complex ecological relationships of this cool desert ecosystem can be studied. The INL Site is owned by DOE and administered through its Idaho Operations Office (DOE-ID). The DOE-ID oversees operations at the INL Site.

Subsurface geology consists of successive layers of basalt and sedimentary strata, overlain by wind- and water-deposited sediments. Most of the Site is in the closed Mud Lake-Lost River drainage basin, which has been informally named the Pioneer Basin. Surface waters within the Pioneer Basin include the Big Lost River, the Little Lost River, and Birch Creek drainages which drain mountain watersheds located to the north and northwest of the Site. All three drainages may flow onto the Site during high flow years but are otherwise ephemeral. In addition, local rainfall and snowmelt contribute to surface water, mainly during the spring. The portion of surface water that is not lost to evapotranspiration infiltrates into the subsurface. Both aquifer and surface waters are used for irrigating crops and other applications outside the Site.

The primary groundwater source of the region is the Eastern Snake River Plain Aquifer (ESRPA) (Figure 1-2). The ESRPA is approximately 320 km (199 mi) long, 30 to 100 km (20 to 60 mi) wide, and encompasses an area of about 2,500,000 hectares (9,650 mi^2). This sole-source aquifer is one of the most productive in the U.S, is a source of process and drinking water to more than 200,000 people, and supplies irrigation water to a large, regional agricultural and aquaculture economy.

The depth to the ESRPA varies from approximately 60 m (200 ft) in the northern part of the INL Site to more than 270 m (900 ft) in the southern part. The aquifer is recharged from infiltrating precipitation and irrigation seepage, runoff from the surrounding highlands, and groundwater underflows from the surrounding watersheds. Groundwater in the ESRPA flows generally to the southwest, although locally the direction of flow is influenced by recharge from rivers, surface water, spreading areas, and heterogeneities in the aquifer. Groundwater flow rates in the vicinity of the INL Site range from approximately 1.5 to 6 m (5 to 20 ft) per day.

Annual rainfall at the Site is light, and the region is classified as arid to semiarid.[7] The long-term average (from March 1950 through 2005) annual precipitation at the Site is 21.6 cm (8.5 in. at the Central Facilities Area ([CFA) station). Monthly precipitation is usually highest in April, May, and June and lowest in July and October. The average daily temperature is 17.1°C (62.7°F) in the summer, and the average daily minimum temperature is - 5.5°C (22.1°F) in the winter. The Site is in the belt of prevailing westerly winds, which are channeled within the plain to produce a west-southeasterly or southwesterly wind at most locations on the Site.

1.3 Summary of INL Site Facilities

The INL Site consists of nine major facilities and several laboratories and administrative buildings located approximately 48 km (30 mi) east of the Site boundary in Idaho Falls, Idaho. Battelle Energy Alliance, LLC (BEA) is the management and operating (M&O) contractor for the INL. In this document, BEA is referred to as the INL contractor. CH2M-WG Idaho, LLC (CWI) is the Idaho Cleanup Project (ICP) contractor and is referred to as the ICP contractor. The Advanced Mixed Waste Treatment Project (AMWTP) contractor is Idaho Treatment Group, LLC (ITG).

1.3.1 INL Facilities

The CFA houses many technical and support services for the INL contractor including administrative offices, monitoring and calibration laboratories, fire protection, medical services, warehouses, vehicle and equipment pools, and bus operations.

The Research and Education Campus (REC) in Idaho Falls consists of office and classroom complexes and multiple laboratory facilities, including many one-of-a-kind advanced labs dedicated to the full spectrum of physical and life science research. The laboratories are “modular,” with respect to their provisions, for ease of utility tailoring and flexibility. There are other advanced R&D laboratories located in Idaho Falls, including engineering demonstration facilities, robotics laboratories, material research laboratories, and advanced information technology and computer simulation and modeling facilities.

The Materials and Fuels Complex (MFC) is the prime testing center in the U.S. for demonstration and proof-of-concept of nuclear energy technologies. Research and development activities at this facility are focused on areas of national concern, including energy, nuclear safety, spent nuclear fuel treatment, nonproliferation, decommissioning and decontamination technologies, nuclear material disposal, and homeland security.

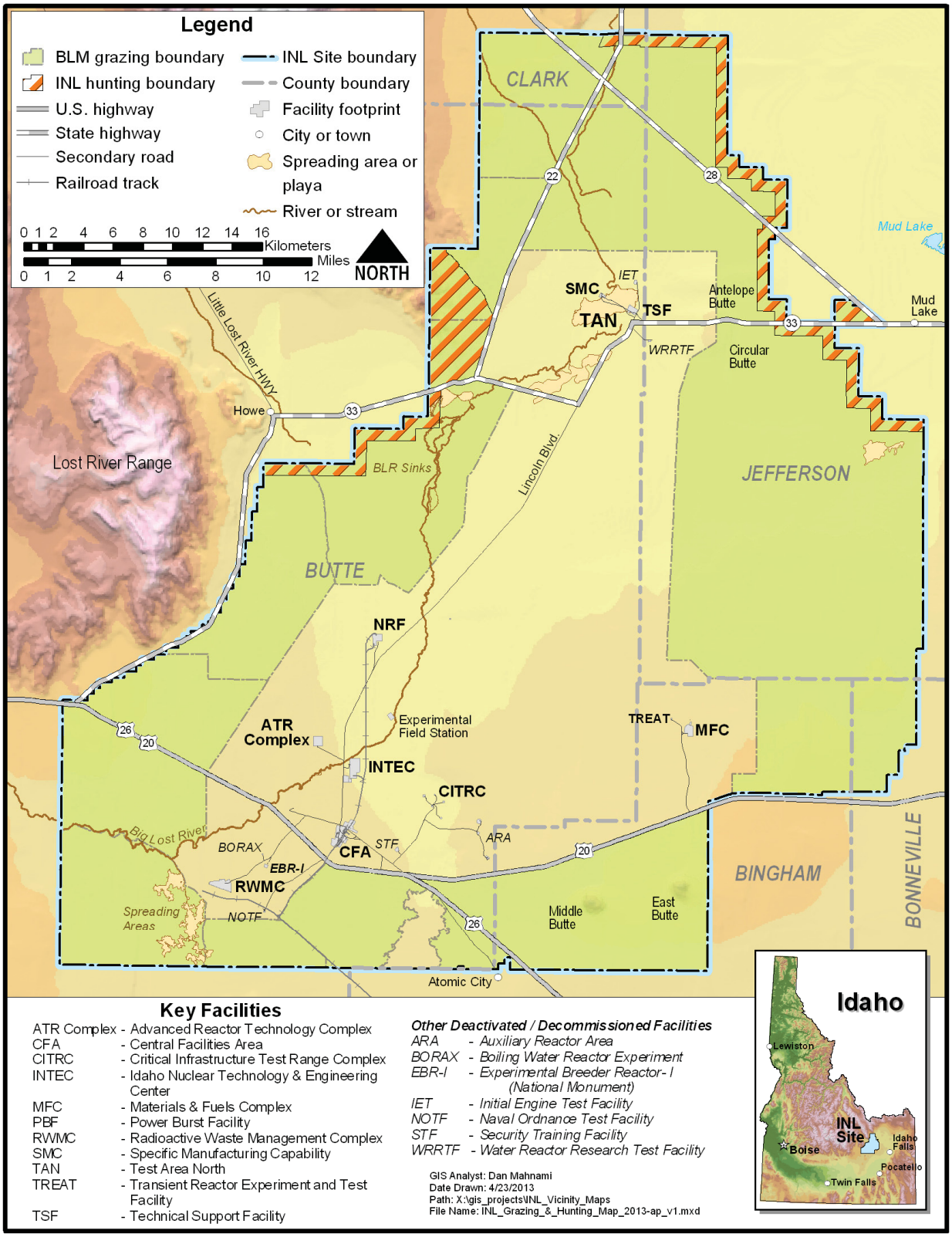

Figure 1-1. Idaho National Laboratory Site.

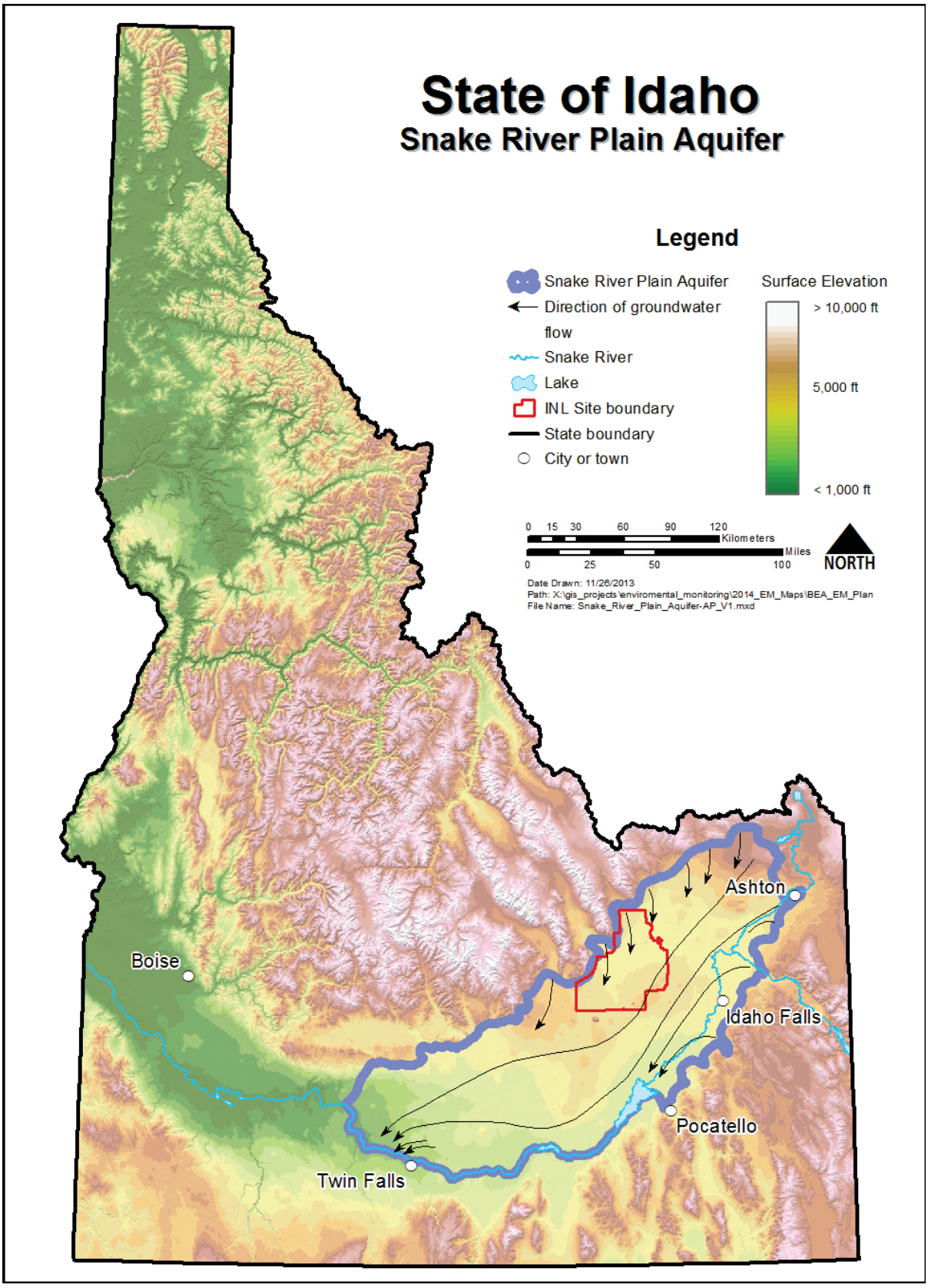

Figure 1-2. Idaho National Laboratory Site in relation to the Snake River Plain Aquifer.

The Advanced Test Reactor Complex (ATR Complex) is the world's most sophisticated nuclear reactor testing complex and has extensive facilities for studying the effects of radiation on materials, testing nuclear fuels, and producing medical and industrial isotopes.

The Critical Infrastructure Test Range Complex (CITRC) is an isolated and secure microcosm of many of the critical infrastructure systems important to the operation of our country, including power, transportation, cyber, and communications. This INL facility was chosen to be a "Test Range" due to its remote location and dedication to various research, development, and testing activities.

The CITRC has a number of specific test beds (12 buildings, approximately 6,652 m^2 [71,600 ft^2], including the following:

- Range Support Area, which consists of office structures, training facility, area power substation, and area water supply system
- National Contraband Detection and Testing Center
- Incident Response Training and Testing Center, Range Control Center facility, and an office building housing the range director's office with other test bed facilities
- Special Programs test facility.

The Specific Manufacturing Capability (SMC) facility, located at Test Area North (TAN) houses a unique project that began with a Memorandum of Understanding between DOE and the U.S. Army in February 1985. Operated by the INL contractor, the SMC Project manufactures armor for the army's M1A2 Abrams battle tank.

1.3.2 Idaho Cleanup Project Facilities

The Idaho Nuclear Technology and Engineering Center (INTEC) was established in the 1950s to recover usable uranium in spent nuclear fuel from government reactors and to store spent nuclear fuel. The current work scope at INTEC includes removing excess nuclear material, closing radioactive and hazardous waste tanks, constructing the Integrated Waste Treatment Unit (IWTU) to prepare the liquid radioactive waste for shipment off-Site, transferring spent nuclear fuel from wet to dry storage, remediating the spent nuclear fuel basin, treating and disposing of waste, closing liquid waste tanks, remediating contaminated environmental sites, and demolishing facilities.

The Idaho CERCLA Disposal Facility (ICDF) is a landfill located just southeast of INTEC. It has been operating since 2003 to dispose of low-level waste and mixed low-level waste from the CERCLA environmental restoration activities within the INL Site.

The Radioactive Waste Management Complex (RWMC) historically managed, stored, and disposed of radioactive waste. Currently, RWMC manages solid transuranic and low-level radioactive waste. RWMC is removing and disposing of targeted waste from the Subsurface Disposal Area (SDA), remediating the SDA, disposing of transuranic waste at an off-Site facility, and demolishing facilities.

TAN, which is located at the north end of the Site, was built in the 1950s to house the nuclear-powered airplane project. CWI has completed cleanup operations at TAN, including demolishing 44 excess facilities. Groundwater is currently monitored at TAN to satisfy specific Comprehensive Environmental Response Compensation, and Liability Act (CERCLA)-related remedial action objectives.

1.3.3 Advanced Mixed Waste Treatment Project Facility

The Advanced Mixed Waste Treatment Project (AMWTP) retrieves mixed transuranic waste from temporary storage, characterizes the waste, treats the waste to meet disposal criteria, and packages the waste for shipment to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. The AMWTP also receives other transuranic waste from INL Site contractors and off-Site DOE facilities for characterization, treatment, and shipment to WIPP. The AMWTP is operated by ITG.

1.3.4 Naval Reactors Facility

The Naval Reactors Facility (NRF), operated by Bechtel Marine Propulsion Corporation, is specifically excluded from detailed discussion in this monitoring plan. As established in Executive Order 12344[7], the Naval Nuclear Propulsion Program is exempt from the requirements of DOE Orders 458.1, *Radiation Protection of the Public and the Environment*[1], and 414D, *Quality Assurance* [8]. The director, Naval Nuclear Propulsion Program, establishes reporting requirements and methods implemented within the program, including those necessary to comply with appropriate environmental laws. NRF's program is documented in the *Naval Reactors Facility Environmental Monitoring Program*[9].

1.3.5 Radiological and Environmental Sciences Laboratory (RESL)

The Radiological and Environmental Sciences Laboratory (RESL) is a government-owned laboratory operated by the U.S. Department of Energy Idaho Operations Office. It is located in Idaho Falls within the REC. RESL and its predecessor organizations have been part of the DOE-ID since 1949. RESL provides an unbiased technical component to DOE oversight of contractor operations at DOE facilities and sites. As a reference laboratory, it conducts cost-effective measurement quality assurance programs that help assure that key DOE missions are completed in a safe and environmentally responsible manner. By assuring the quality and stability of key laboratory measurement systems throughout DOE, and by providing expert technical assistance to improve those systems and programs, it assures the reliability of data on which decisions are based. As a result, customers and stakeholders have greater confidence that those programs protect workers, the public, and the environment. RESL's core scientific capabilities are in analytical chemistry and radiation calibrations and measurements.

2. INL SITE ENVIRONMENTAL MONITORING OVERVIEW

Effluent monitoring of airborne emissions and liquid effluents is driven by DOE and Environmental Protection Agency (EPA) requirements, state and federal regulations, and facility operating permits. Effluent monitoring refers to the collection and analysis of samples, or measurements of liquid and gaseous effluents for characterizing and quantifying contaminants, assessing radiation exposures of members of the public, controlling effluents at or near the point of discharge, and demonstrating compliance with applicable standards and permit requirements. Liquid and airborne effluents from facilities are monitored for radiological and nonradiological parameters.

Environmental surveillance is the collection and analysis of samples or direct measurements of air, water, soil, biota, and agricultural products from DOE sites and their environs. These activities are performed to generate measurement based estimates of the amounts or concentrations of contaminants in the environment. Measurements are performed by sampling ad laboratory analysis or by "in place" measurement of contaminants in environmental media. Environmental surveillance activities are discussed in more detail in Section 4 and are conducted to:

- Comply with DOE Order 458.1[1]
- Determine potential effects of contaminants on the public and the environment
- Evaluate pathways through which contaminants move in the environment.

In addition to effluent monitoring and environmental surveillance, meteorological conditions are monitored in and around the Site. Meteorological monitoring provides information needed to support and interpret the results of other monitoring and surveillance activities, particularly for air dispersion modeling. Meteorological monitoring activities are discussed in Section 5.

Ecological resource monitoring documents sensitive and threatened species on the Site, evaluates habitat needs, and monitors biota population trends and weed invasions in disturbed areas. These data better enable the evaluation of environmental impacts of operations and help determine restoration and mitigation needs. These activities are discussed in Section 4.9.

Cultural resource monitoring enables the Site Cultural Resources Management Office (CRMO) staff to gather baseline data and assess the condition of known cultural resources that have the potential to be impacted by natural processes, unauthorized activities, or inadvertently by project activities. If impacts are noted during monitoring visits, appropriate notifications are made as outlined in DOE/ID-10997, *INL Cultural Resource Management Plan*[11] and as legitimized through Programmatic Agreement between the Idaho State Historic Preservation Office, the Advisory Council on Historic Preservation and DOE-ID. By identifying impacts to cultural resources in this manner and implementing mitigation or treatment plans, federal stewardship responsibilities are fulfilled by completing actions to avert further deterioration. Certain properties that are of special significance to the Shoshone-Bannock Tribes and other groups are monitored at least once per year while others are chosen based on known threats (i.e., close to public roads, ongoing projects in the vicinity). Because of tribal sensitivities, all projects that will disturb the ground in and around the CITRC area are monitored. Details of the annual monitoring activities are reported to DOE-ID annually in the *INL Monitoring Report* and are summarized for the public in the *INL Cultural Resource Management Program Activities Report*. A description of the INL Site CRMO monitoring program is located in Appendix L of DOE/ID 10997[11].

A separate system of environmental monitoring and surveillance is activated during environmental events, which may be planned, as in startup of new equipment/process, or unplanned, such as operational events or wild fires. This environmental event monitoring is discussed in Section 6. Environmental reporting on compliance and regulatory sampling is discussed in Section 7.

The locations of monitoring stations within and surrounding the Site are shown in Figure 2-1. Appendix A includes tables for various media monitored at the INL Site and contains each sample point and geographic location along with the organization responsible for the monitoring.

2.1 History of Environmental Monitoring at the INL

Some of the earliest environmental monitoring on the INL Site was completed by the U.S. Weather Bureau, which created a Research Station in 1948 to support the National Reactor Testing Station, as the INL Site was then called. The Research Station still exists as the Air Resources Laboratory Field Research Division (ARLFRD) of the National Oceanic and Atmospheric Administration (NOAA). The Station's task was to develop a basic understanding of the regional meteorology and climatology, with a focus on protecting the health and safety of workers and nearby residents using meteorological measurements and transport and dispersion models.

In 1949, the Health and Safety Division of the Idaho Operations Office of the Atomic Energy Commission collected numerous samples to determine the pre-reactor radionuclide background in soil, plants, animals, etc., at the Site[13]. The United States Geological Survey (USGS) also began monitoring hydrologic conditions of the Eastern Snake River Plain Aquifer (ESRPA) in 1949 by sampling nine on-Site wells.

In 1959, the first of several aerial radiological surveys of the Site was performed under the direction of the Idaho Operations Office in an attempt to determine the extent of natural and man-made radioactivity. Subsequent aerial surveys performed in 1965, 1974, 1982, and 1990 focused mainly on characterizing facilities and associated regions of the Site[14].

Between 1956 and 1963, ecological research was conducted on-Site by Health Services Laboratory (HSL), which focused on movement of radioactive contaminants through the food chain. Rabbits were sampled as indicators of the extent of contamination around Site facilities. In 1970, HSL established a routine soil sampling and monitoring program for radionuclides in the surface soils near INL Site facilities and the surrounding area.

In 1973, the Radiological and Environmental Sciences Laboratory (RESL) incorporated a biological component into its program that included extensive studies of radionuclide-contaminated areas and transport by biota from these areas. In 1977, HSL merged with RESL and the RESL Program continued on-Site and off-Site monitoring through 1993.

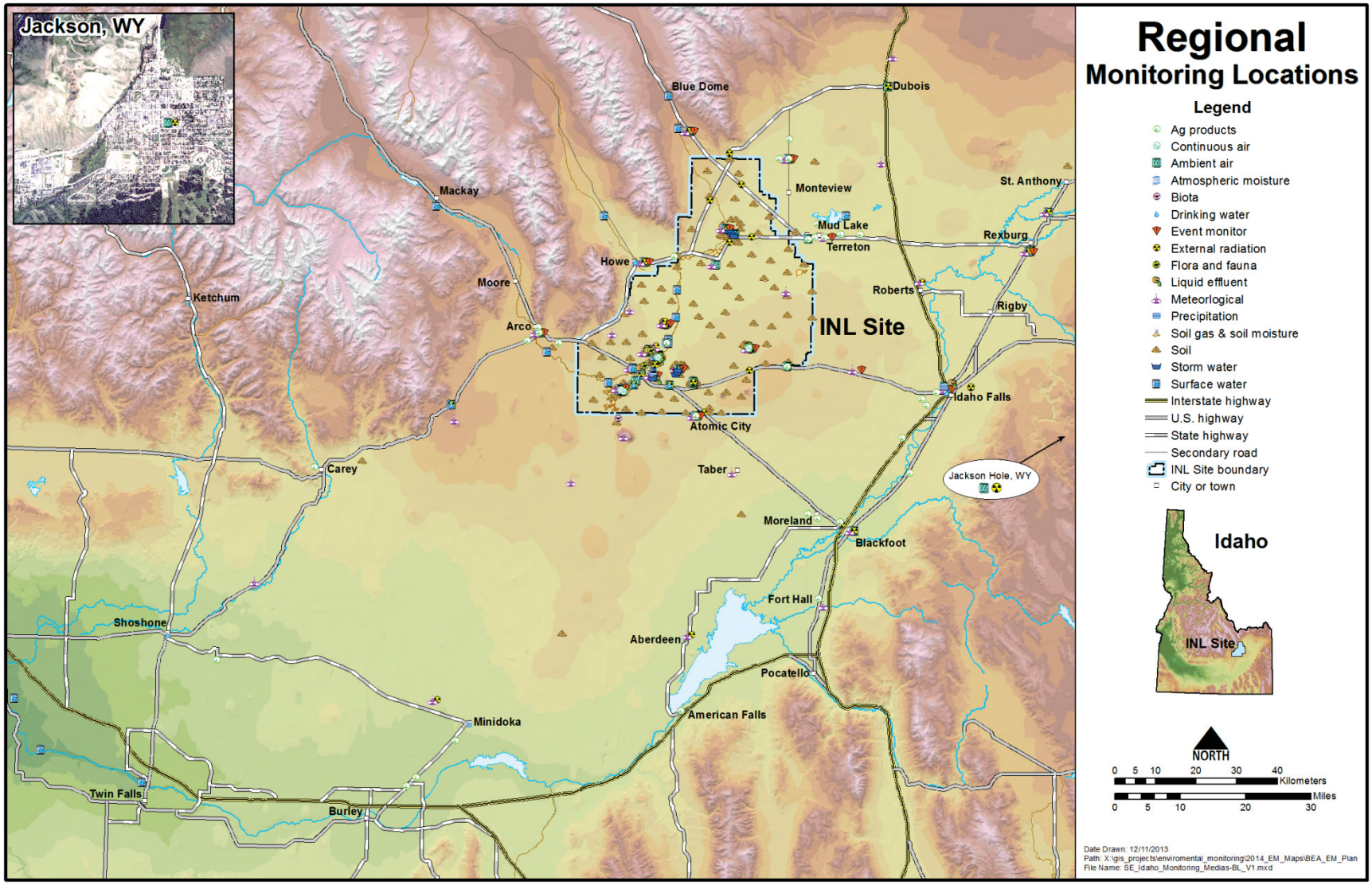

Figure 2-1. Regional monitoring locations.

In 1989, the INL Site was placed on the National Priorities List found at http://www.epa.gov/superfund/sites/npl/. In 1991, DOE, EPA, and the state of Idaho signed the *Federal Facility Agreement and Consent Order*[14] under 42 USC § 9601, *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA)[15] to ensure that environmental hazards associated with contaminant releases were identified and remediation was completed. Since 1991, comprehensive remedial investigations/feasibility studies and Records of Decision (RODs) have been completed for most of the ten Waste Area Groups (WAGs) identified, and remediation in some areas has been completed. As part of CERCLA regulatory commitments, long-term monitoring is ongoing.

Also, in 1989, the Idaho Legislature established a comprehensive state oversight program for the INL Site. In 1990, Idaho became the first state in the nation to negotiate an agreement (Environmental Oversight and Monitoring Agreement[16]) with DOE to provide funding for independent environmental oversight and monitoring of a DOE facility. Over the years, the INL Oversight Program has developed an effective monitoring network to verify and supplement INL Site monitoring programs and to assure that DOE activities protect Idaho's environment. The INL Oversight Program also provides independent information concerning DOE impacts on the public and environment.

In 1994, DOE transferred the responsibility for on-Site environmental surveillance from RESL to the prime INL M&O contractor, and all off-Site environmental surveillance was transferred to a private contractor under the Environmental Surveillance, Education and Research (ESER) Program. Currently, the ESER Program continues to conduct off-Site surveillance. The on-Site program was split in 2005 with award of contracts to BEA and CWI, whose facilities and activities are discussed in other parts of this plan.

Environmental monitoring performed by the various contractors in charge of facility operations initially involved limited sampling of liquid and airborne effluents from the facilities to develop waste inventory information and to meet operational monitoring objectives. Over the years, these contractor-run monitoring programs have evolved to ensure compliance with applicable federal, state, and local regulations and protect human health and the environment.

2.2 Environmental Monitoring Organizations

A number of organizations conduct environmental monitoring activities on or in the vicinity of the Site. Three organizations conduct monitoring at facilities they operate—BEA, CWI, and ITG. Other organizations perform INL Site-related environmental monitoring but do not operate facilities—NOAA, Gonzales-Stoller Surveillance, LLC (GSS), and USGS. Currently, BEA has Site-wide environmental monitoring responsibilities and conducts environmental monitoring at the facilities under its control.

Table 2-1 lists the environmental monitoring organizations at the INL Site and summarizes the environmental media monitored by each.

2.2.1 ICP and INL Contractors

The INL and ICP contractors conduct environmental monitoring activities at facilities under their respective areas of purview, as discussed in section 1.3 of this Plan. Both the INL and ICP contractors perform liquid and airborne effluent monitoring, along with environmental surveillance of ambient air, groundwater, drinking water, surface water runoff, soils, and external radiation. The ICP contractor also monitors biota. Compliance monitoring programs have been instituted to meet the monitoring requirements of federal, state, and local regulations, permits, and DOE orders. Requirements exist to sample drinking water, liquid effluents, injection well basins for storm water runoff, and groundwater. Facilities with airborne emissions are responsible for monitoring airborne effluents in compliance with the standards set forth in Public Law 91-604, *Clean Air Act Amendments of 1990*[17] and Idaho Administrative Procedures Act (IDAPA) 58.01.01, *Rules for the Control of Air Pollution in Idaho*[18] . Those facilities with Wastewater Reuse Permits (WRPs) are monitored as required by their associated

permits in accordance with the Wastewater Rules (IDAPA 58.01.16)[19], the Recycled Water Rules (IDAPA 58.01.17)[20], and the Ground Water Quality Rule (IDAPA 58.01.11)[21].

Both INL and ICP contractors perform CERCLA monitoring of groundwater and soil, and the ICP contractor conducts ecological monitoring. A majority of the CERCLA monitoring is performed by the ICP contractor, because the INL contractor is only responsible for the CERCLA work at MFC. Sites with residual contamination will need to be monitored, controlled, operated, and maintained by institutional controls to protect human health and the environment.

Post closure monitoring is conducted to evaluate the effectiveness of the final remedies and ensure that no additional contamination is occurring. However, even though CERCLA regulates most INL Site stewardship activities, INL expects some stewardship activities to be regulated under the Resource Conservation and Recovery Act (RCRA), including post closure groundwater monitoring. The monitoring of facilities operated by both INL and ICP contractors will continue at the remediation areas for the period negotiated in the RODs 5-year review reports, in RCRA closure plans, or in other laws or agreements that govern the remedies.

Table 2-1. Summary of INL Site environmental monitoring organization activities.

	Organization					
	INL	ICP	AMWTP	ESER	USGS	NOAA
Effluent						
Airborne	X	X	X			
Liquid	X	X				
Storm Water	X					
Surveillance						
Ambient Air	X[a]	X		X[a]		
Drinking Water	X	X		X		
Precipitation				X		
Groundwater	X	X			X	
Surface Water		X		X	X	
Soil	X	X		X		
Biota		X		X		
Agricultural Products & Game Animals				X		
External Radiation	X	X		X		
Ecological		X		X		
Meteorological						X

a. Includes collection of atmospheric moisture samples.

The staff of CRMO monitors cultural resources for both INL and ICP contractors. The CRMO provides cultural resource management services to the ICP contractor through an agreement between the two contractors. The CRMO services facilitate a coordinated and seamless management of Site cultural resources for DOE-ID and inform and educate stakeholders about the INL Site's more than 13,000-year history of rich and varied human land use. The CRMO staff of professional archaeologists, historians, and anthropologists conducts monitoring to determine if natural events or human activities are impacting Site cultural resources and to provide current information regarding the resources' preservation and protection. As required through an agreement between DOE-ID and the Shoshone-Bannock Tribes, the CRMO staff invites tribal participation during monitoring activities of properties that are of importance to them (Agreement-in-Principle 2007)[22]. Cultural resource management is described in detail in DOE/ID-10997, "Idaho National Laboratory Cultural Resource Management Plan"[11].

2.2.2 AMWTP

The Idaho Treatment Group, LLC (ITG) performs limited environmental monitoring in compliance with the Clean Air Act.

2.2.3 ESER Program

The ESER Program, currently managed by GSS, primarily conducts off-Site environmental surveillance for DOE-ID. The ESER Program's primary responsibility is to monitor a number of different pathways by which radiological pollutants from the INL Site could reach the public. Current services provided by the ESER Program include off-Site sample collection and analyses of air (including analysis of moisture in air for tritium), precipitation, surface water, drinking water, soil, milk, wheat, lettuce, potatoes, alfalfa and animal tissue samples; measurement of external ambient radiation; wildlife habitat and vegetation surveys, and ecological research on and near the Site; research concerning endangered species, pollutants in the environment, and revegetation; environmental education concerning ecological and radiological issues around the INL Site; and preparing the Annual Site Environmental Report (ASER) summarizing environmental monitoring activities across the INL Site.

2.2.4 USGS

The USGS collects water samples and measurements in and around the Site boundary to describe hydrologic and geochemical conditions and to evaluate effects of waste disposal and other activities at the Site on the hydrogeologic system. The data are used to prepare interpretive reports. The USGS groundwater monitoring is detailed in DOE/ID-11034, "Idaho National Laboratory Groundwater Monitoring and Contingency Plan"[43].

The USGS monitors more than 160 wells within a regional network in the ESRPA, both on-Site and off-Site, to study contaminant migration and determine groundwater quality and quantity as they relate to Site operations. Well placement within the regional network and constituent selection supplements existing INL and ICP contractors' groundwater monitoring programs. The USGS also monitors seven surface water sites on the Big Lost River, Little Lost River, Birch Creek, and Mud Lake.

2.2.5 NOAA

NOAA provides meteorological services and supporting research to the INL Site through the Air Resources Laboratory Field Research Division (ARLFRD). The ARLFRD operates a large meteorological monitoring network to characterize the meteorology and climatology of the eastern Snake River Plain, which includes the INL Site.

Meteorological monitoring data are required to characterize atmospheric transport and diffusion conditions in the vicinity of the Site and to represent other meteorological conditions (e.g., precipitation, temperature, and atmospheric moisture) that are important to environmental surveillance activities, such as air quality and radiological monitoring.

2.2.6 Idaho Environmental Monitoring Program

The Idaho Environmental Monitoring Program (IEMP) is jointly supported by the INL Oversight Program, DOE-ID, NOAA, and the Shoshone-Bannock Tribes. Four weather stations were constructed in 1997 at publicly accessible locations in southeastern Idaho. These stations are located in Idaho Falls, Fort Hall, Terreton, and the Big Lost River Rest Area on U.S. Highway 20/26.

2.3 Laboratory-wide Monitoring Committees

2.3.1 Monitoring and Surveillance Committee and Groups

The INL Site has a Monitoring and Surveillance Committee (MSC) with participating organizations from DOE-ID, INL, ICP, AMWTP, NRF, ESER Program, INL Oversight Program, NOAA, USGS, and the Shoshone-Bannock Tribes. Chartered in 1997, the MSC provides a means for exchanging and sharing technical information, expertise and data. The MSC is to provide a collaborative atmosphere in which the participating organizations can communicate and discuss what they are doing in the areas of environmental monitoring and surveillance and make recommendations where appropriate.

2.3.2 INL Water Committee

The INL Water Committee was established in 1994 to coordinate drinking-water-related activities across the Site and to provide a forum for exchanging information related to drinking water systems. In 2007 the committee was expanded to include wastewater, storm water, and groundwater interests. In 2011, the Water Committee incorporated membership from the former Water Resource Committee to serve as a resource for the coordination and exchange of technical information on water-related activities.

The committee meets quarterly and includes participants from DOE-ID, USGS, INL, ICP, AMWTP, and NRF. Water and wastewater-related issues addressed during these meetings include regulatory issues, the Cross-Connection Program, construction activities, facility-specific activities, sampling, analytical results, and training.

3. EFFLUENT MONITORING

Operations of Site facilities have the potential to release pollutants such as radioactive and nonradioactive contaminants into the environment. These pollutants can enter the atmosphere as airborne effluents and can enter surface and groundwater as liquid effluents or storm water runoff via injection wells. The following subsections summarize the effluent monitoring currently conducted by various organizations at the INL Site.

3.1 Airborne Effluent

Regulated facilities at the INL Site are required, under Public Law 91-604[17] and IDAPA 58.01.01[18], to measure and estimate airborne effluents. These facilities include:

- Advanced Mixed Waste Treatment Plant (AMWTP)
- Central Facilities Area (CFA)
- Idaho Nuclear Technology and Engineering Center (INTEC)
- Critical Infrastructure Test Range Complex (CITRC)
- Materials and Fuels Complex (MFC)
- Radioactive Waste Management Complex (RWMC)
- Test Area North (TAN)
- Advanced Test reactor (ATR) Complex
- Specific Manufacturing Capability (SMC)
- INL Research and Education Campus (REC)

One Tier I Operating Permit and several Permits to Construct have been granted by the Idaho Department of Environmental Quality (DEQ). These permits include specific air emission sources at the various Site facilities.

Numerous stack emissions are monitored for radioactive pollutants, but specific stack emission monitoring depends on the facility source term. Some monitoring is required by regulation or DOE order, and some monitoring is conducted as a best management practice or for facility information. Where monitoring is performed, emissions are normally sampled after abatement; otherwise, emissions are estimated on the basis of engineering calculations or process knowledge.

Continuous monitoring is required for emission points that have a potential to emit radionuclides[a] in quantities that could result in an effective dose equivalent (EDE) to a member of the public in excess of 0.1 millirem (mrem) per year, which is 1% of the of 10 mrem per year specified by the National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 61, Subpart H[5].

Monitoring for compliance and screening purposes is conducted in accordance with the guidance of 40 CFR 61, Appendix B, *Method 114*[23], ANSI N13.1, *Sampling and Monitoring Releases of Airborne Radioactive Substances from Stacks and Ducts of Nuclear Facilities*[24], and the air monitoring recommendations of DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*[4].

The contractor associated with each permitted facility at the Site is responsible for airborne effluent monitoring at their facility. Figure 3-1 shows the locations of those emission sources that currently require continuous monitoring by Subpart H of 40 CFR 61[5]. Sources shown in Figure 3-1 at RWMC

[a] The "potential to emit radionuclides" is evaluated by assuming normal facility operations; however no credit is taken for reduction of emissions by abatement equipment.

include both RWMC and AMWTP as listed in Section 3.1. The following information on airborne effluent emissions and sources associated with contractor-operated facilities is summarized in DOE/ID-10890, *National Emission Standards for Hazardous Air Pollutants INL Report for Radionuclides*[25].

Other sources with the potential to emit low quantities of radioactive emissions also exist at other contractor-operated facilities. Emissions from sources that could cause annual doses to the maximally exposed individual greater than 10^{-5} mrem are periodically monitored and included in calculating the INL Site's annual EDE to members of the public.

3.1.1 INL Contractor

The INL contractor-operated facilities are monitored for air emissions associated with R&D and operational activities as described in the following paragraphs. Release points at INL Site facilities that do not require continuous monitoring are sampled periodically to provide emissions data for INL Site reports and permit requirements as well as a best management practice.

CFA. Minor releases occur from CFA facilities where work is routinely conducted with small quantities of radioactive materials. This includes operations at the CFA Laboratory Complex CFA-625. Only trace quantities of radioactive materials are used at the facility. Additional radioactive emissions are associated with decontamination activities, sample analyses, and site remediation.

ATR Complex. Radiological air emissions from the ATR Complex are primarily associated with operation of the Advanced Test Reactor. These emissions include noble gases, iodines, and other mixed fission and activation products. Other radiological air emissions are associated with hot cell operations, sample analysis, site remediation, and R&D activities.

REC. Radiological releases from the REC could arise from uncontrolled laboratory fume hoods within the INL Research Center (IRC) facility. Exhaust from most of the fume hoods is released directly to the outside atmosphere via the heat recovery fan system in the IRC heating, ventilating, and air conditioning system. Other potential release points include IF-603, the System Analysis Facility, RESL, and the INL Engineering Demonstration Facility.

MFC. MFC has three release points that require continuous emission monitoring as specified under 40 CFR 61, Subpart H[5]: the Experimental Breeder Reactor (EBR)-II/Fuel Conditioning Facility Main Stack (MFC-764); the Hot Fuel Examination Facility Stack (MFC-785); the Fuel Manufacturing Facility (MFC-704); and the Irradiated Materials Characterization Laboratory (IMCL) (MFC-1729).

SMC. Operations at SMC include material development, fabrication, and assembly work to produce armor packages for the U.S. Department of the Army. Other activities include developing tools and fixtures and preparing and testing metallurgical specimens. Radiological air emissions from SMC are associated with processing of depleted uranium. Potential emissions are uranium isotopes and associated radioactive progeny.

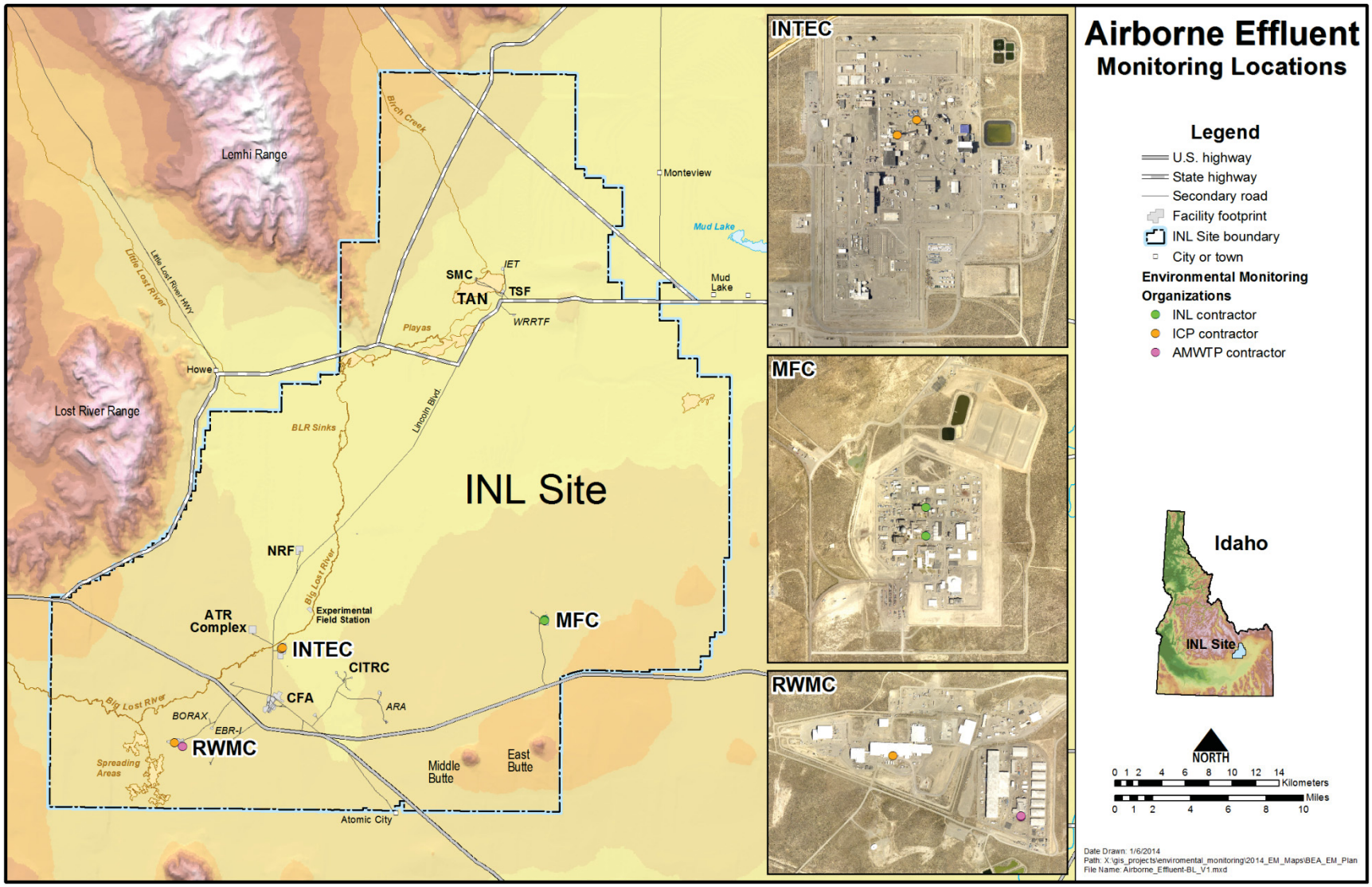

Figure 3-1. Airborne effluent monitoring locations.

3.1.2 ICP Contractor

The ICP remediation and waste management activities are conducted in compliance with federal and state rules. The ICP radiological emissions originate from process equipment, deactivation/demolition activities, and waste management. The ICP monitors radioactive emissions at INTEC and RWMC as described in the following paragraphs:

INTEC. Emissions from INTEC are primarily associated with spent nuclear fuel management (e.g., fuel receipt and wet and dry storage areas). Radioactive emissions include noble gases, iodines, and other mixed fission and activation products. Additional radioactive emissions are associated with decontamination and debris treatment activities, site remediation, R&D, radiological and hazardous waste accumulation areas, remote-handled transuranic waste characterization and repackaging, and other miscellaneous emissions from radioactively contaminated buildings and liquids in tanks. Emission monitors at the INTEC Main Exhaust Stack (CPP-708-001), Fluorinel Dissolution Process and Fuel Storage Stack (CPP-767-001), the New Waste Calcining Facility Stack (CPP-659-033), and the Integrated Waste Treatment Unit (IWTU) continuously monitor radiological emissions from these stacks.

RWMC. Radiological air emission point sources at the RWMC include three vapor vacuum extraction units in the Subsurface Disposal Area (SDA) and the Accelerated Retrieval Project (ARP) excavation enclosures. The ARP shows compliance with the NESHAP standard using ambient air measurements. Using the ambient air monitors for ARP compliance measurements is approved by EPA and meets the requirements specified by the NESHAP (40 CFR 61.93 (g))[26]. Ambient air is monitored at the former ARP-V location (WMF-1617) for the RCRA Sludge Repackaging Project. EPA has approved continued use of the former ARP-V monitor to monitor for the Sludge Repackaging Project[27]. Three high-volume air samplers are located near the EBR-I facility, and a fourth sampler is operated at Howe, Idaho to serve as a control. The ARP ambient air measurement project is documented in ICP PLN-720, *Environmental Surveillance Program Plan*[28]. For emissions from the ARP, the EBR-I facility is a conservative surrogate location for the INL Site's maximally exposed individual.

Periodic/confirmatory measurements of carbon-14 (C-14) and tritium (H-3) emissions from the three vapor vacuum extraction units are made twice a year. As disposal areas are filled, they are covered with soil. Gaseous forms of radionuclides – particularly, H-3 and C-14 from activated beryllium – are released from the SDA surface soil. The amounts of these radionuclides released to air are estimated based on site-specific corrosion data for buried beryllium, assuming that all of the C-14 and H-3 released to the soil by corrosion of the beryllium is immediately emitted to the atmosphere. Measurements of C-14 and H-3 in soil gas collected near a known beryllium disposal location are used to determine whether the release rate to soil has unexpectedly increased. A small amount of H-3 is pumped from the aquifer beneath the RWMC for use at the facility, and then is released from the surface of the RWMC sewage lagoon. Emissions of H-3 from the lagoon are conservatively estimated by assuming all of the H-3 pumped from the aquifer is immediately released to the atmosphere.

3.1.3 AMWTP

Operational features associated with the AMWTP consist of processes to vent waste containers, perform nondestructive examination of container contents, and certify, treat, store, and assemble and load waste containers for transport and disposal.

Operational activities at the AMWTP, operated within the Transuranic Storage Area at RWMC, could potentially result in the release of radiological and other pollutants to the atmosphere. Currently, AMWTP continuously monitors for radioactive particulates at three stack locations—two stacks on WMF-676 and one stack on WMF-636. Periodic confirmatory stack sampling is conducted for the characterization facilities WMF-634 and WMF-636. These emissions do not require continuous monitoring for NESHAP, but periodic confirmatory measurement is required to verify that emissions are less than 0.1 millirem per year. These emissions are monitored and calculated and are included in the Site's annual EDE to

members of the public. Monitoring requirements for emissions are specified in AMWTP-MP-EC&P-7.5, "Advanced Mixed Waste Treatment Project National Emissions Standards for Hazardous Air Pollutants Emissions of Radionuclides"[29].

3.2 Liquid Effluent

Operations at the INL Site may result in the release of liquid effluent discharges containing radioactive or nonradioactive pollutants. Effluent monitoring includes the collection and analysis of samples and other measurements to establish the type and concentrations of pollutants in liquid discharges from facilities. Monitoring also provides data to evaluate the effectiveness of liquid effluent treatment and control systems, identifies potential contaminant source areas and environmental problems, and provides a mechanism for detecting, characterizing, and reporting unplanned releases.

Direct discharge of wastewater to the land surface is regulated under IDAPA 58.01.17, *Recycled Water Rules*[20], formerly the Wastewater Land Application Rules, and IDAPA 58.01.16, *Wastewater Rules*[19]. Four facilities operated by the INL and ICP contractors have Wastewater Reuse Permits (WRPs) issued by the DEQ; all four require monitoring of liquid effluents for facility-specific parameters.

Additional liquid effluent monitoring is performed in support of DOE environmental protection objectives. Radiological liquid effluents are monitored in accordance with DOE Order 458.1[1] and the recommendations of DOE/EH-0173T[4]. A risk-based approach, identified in PLN-8540, *Idaho National Laboratory Liquid Effluent Monitoring Plan*[30], is used by the INL contractor to determine which nonpermitted effluent streams or additional nonpermitted parameters require monitoring. The ICP contractor has a similar approach documented in PLN-932, *Management Plan and Implementation of Best Available Technology per DOE Order 5400.5 for Disposal of Wastewater*[31]. The risk-based approach considers the likelihood that an effluent measurement equals or exceeds a regulatory limit or environmental release level. It will also determine the severity of the exceeded levels, were such an event to occur.

Figure 3-2 shows liquid effluent monitoring locations currently sampled across the Site. Some facilities have in-line alarm monitors located upstream from the routine effluent monitoring locations. These monitors are used to detect radiation or pH levels that fall outside predetermined levels.

3.2.1 INL Contractor

The INL contractor conducts sampling on the wastewater treatment systems at MFC, CFA, and the ATR Complex and monitors for nonradioactive and radioactive parameters in liquid waste effluents as required by the applicable WRP and DOE environmental protection objectives. Specific liquid effluent monitoring locations, frequencies, and analyses are documented in PLN-8540[30] and associated procedures.

Wastewater reuse permits (WRPs) are in effect for the ATR Complex Cold Waste Pond, the CFA Sewage Treatment Plant (STP), and the MFC Industrial Waste Pond and Industrial Waste Ditch. Discharge of wastewater to the land surface is regulated by wastewater rules (IDAPA 58.01.16[19] and 58.01.17[20]). The CFA WRP requires monitoring but does not specify release limits. The WRPs for the ATR Complex Cold Waste Pond and the MFC Industrial Waste Ditch and Industrial Waste Pond specify maximum effluent concentrations for total suspended solids and total nitrogen. These facilities also have specific radiological and other parameters monitored for surveillance purposes in order to comply with DOE order458.1[1]. Furthermore, the permits generally require that data from groundwater monitoring wells at the INL Site comply with the Idaho groundwater quality primary constituent standards and secondary constituent standards (IDAPA 58.01.11)[21]. The permits specify annual discharge volumes, application rates and effluent quality limits. All permitted and nonpermitted facilities are monitored in accordance with state of Idaho requirements. As a best management practice and to comply with DOE orders, the INL contractor also monitors the MFC sanitary sewage lagoon.

The INL Site facilities located in Idaho Falls are required to comply with the applicable regulations in Chapter 1, Section 8 of the *Municipal Code of the City of Idaho Falls*[32]. Industrial wastewater acceptance forms are obtained for facilities that dispose liquid effluent through the City of Idaho Falls sewer system. Industrial wastewater acceptance forms include general requirements that apply to all REC facilities and specific monitoring requirements for the IRC owing to the nature of activities conducted therein. The city of Idaho Falls currently monitors effluents at the IRC for compliance with the City's wastewater acceptance criteria.

3.2.2 ICP Contractor

A WRP is in effect for the INTEC New Percolation Ponds. Discharge of wastewater to the land surface is regulated by IDAPA 58.01.16[19] and IDAPA 58.01.17[20]. The INTEC WRP requires liquid effluent monitoring but does not specify any release limits. The facility also has specific radiological and other field parameters monitored for surveillance purposes in order to comply with DOE Order458.1[1]. Furthermore, the permit generally requires that data from groundwater monitoring wells at the New Percolation Ponds comply with the IDAPA 58.01.11[21] groundwater quality primary constituent standards and secondary constituent standards. The permit also specifies daily and annual discharge volumes. Liquid effluent monitoring is performed in accordance with PLN-729, *Idaho Cleanup Project Liquid Effluent Monitoring Program Plan*[33].

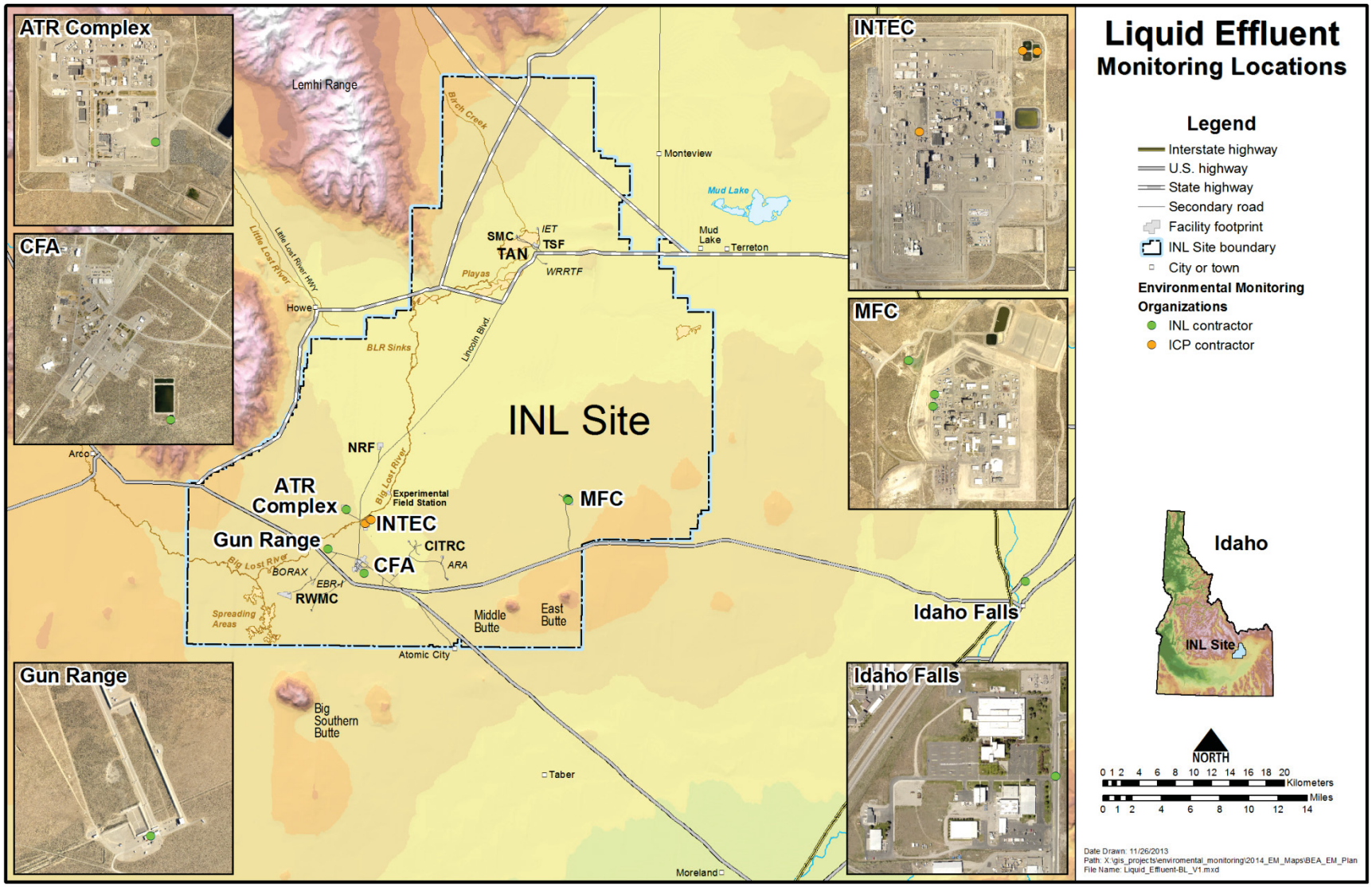

Figure 3-2. Liquid effluent monitoring locations.

3.3 Injection Wells

Storm water discharges to injection wells are monitored to ensure compliance with state of Idaho permits and to protect the Snake River Plain aquifer (Figure 3-3) as regulated by IDAPA 37.03.03, *Rules for the Construction and Use of Injection Wells*[34]. Injection wells have been constructed to control flooding resulting from storm water or snowmelt runoff. The INL contractor monitors discharges of storm water at injection well locations during large precipitation events or snowmelt conditions to evaluate potential pollutants in the storm water.

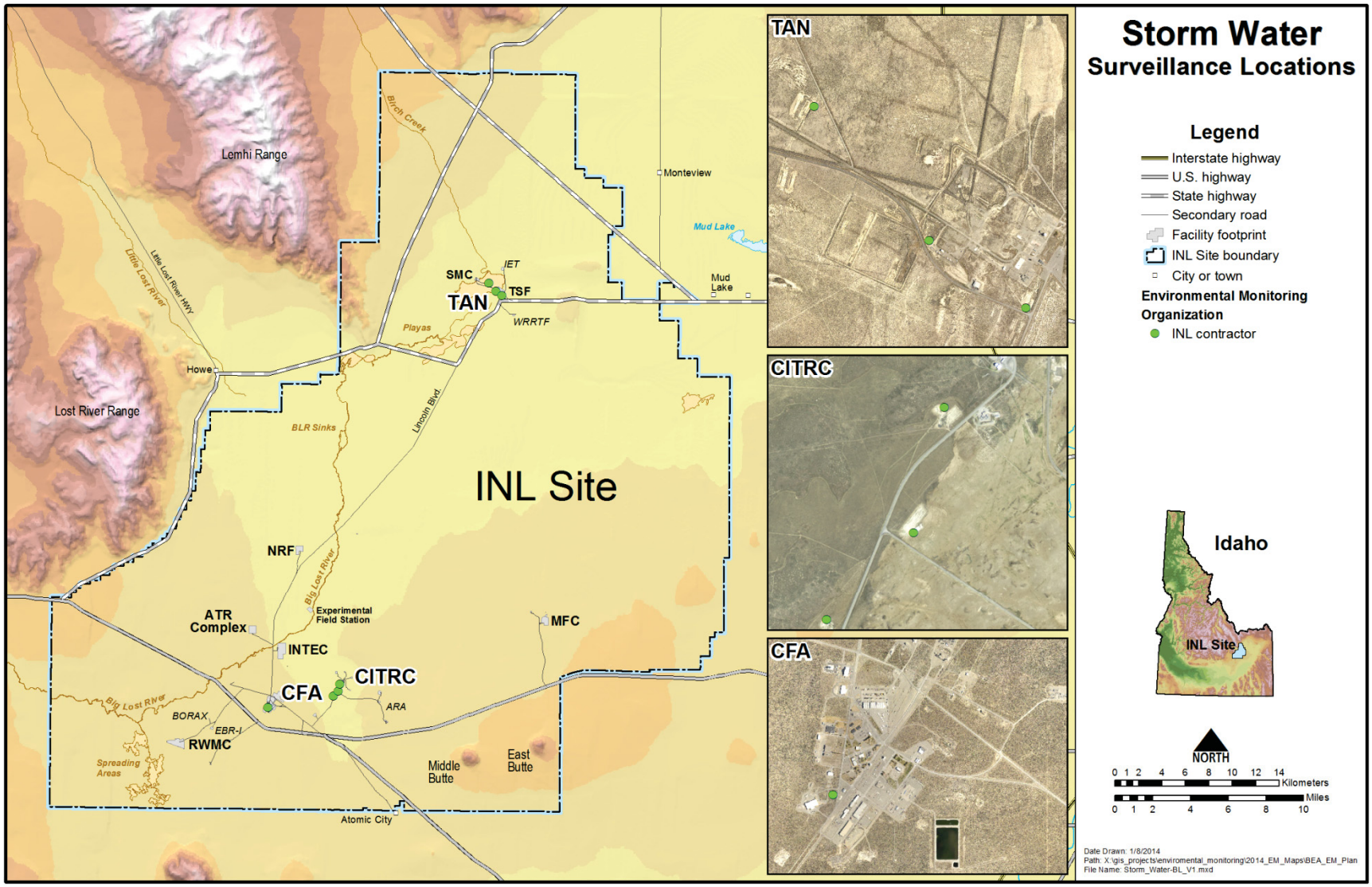

Figure 3-3. Storm water injection well basin monitoring locations.

4. ENVIRONMENTAL SURVEILLANCE

Environmental surveillance at the INL Site includes the collection and analysis of samples or direct measurements of air, water, soil, biota, and agricultural products. Environmental surveillance is conducted by several organizations to support laboratory-wide compliance with DOE Order DOE Order 458.1[1], environmental laws and regulations and DOE agreements, and follows the criteria in DOE/EH-0173T[4] for establishing environmental surveillance programs.

Separate on-Site environmental surveillance is required for waste management facility operations to meet DOE Order 435.1, *Radioactive Waste Management*[3] requirements. The SDA at RWMC is the only low-level waste disposal facility at the Site and is required to be monitored for DOE Order 435.1[3] compliance. Waste management surveillance monitoring is designed to be more facility- or source-specific than other site-wide surveillance.

4.1 Ambient Air

The air pathway is the most likely transport pathway for which INL Site contaminants could reach off-Site populations according to DOE/ID-12119, *Idaho National Engineering Laboratory Historical Dose Evaluation*[35]. Using a network of low-volume air samplers, several organizations monitor ambient air to compare concentrations at on-Site release locations with off-Site control locations. The network of regional ambient air monitoring locations is shown in Figure 4-1, and the on-Site ambient air monitoring locations are shown in Figure 4-2. Ambient air particulate matter and airborne radionuclides are also sampled during wildfires or other emergency events. (Refer to Section 6.1 for a discussion of air monitoring performed for operational emergencies.)

The various organizations conducting air monitoring are discussed below.

4.1.1 INL Contractor

The INL contactor measures airborne radionuclides and monitors for potential trends in radioactivity in the environment per PLN-8510, *Planning and Management of Environmental Support and Services Monitoring Activities*[36], PLN-8550, *Environmental Support and Services Monitoring Services Surveillance Plan*[37], and supporting Laboratory Instructions (LIs). The ambient air monitoring activities support INL Site compliance with DOE Order 458.1[1] and the Idaho Air Quality Operating Permit. Atmospheric particulates released from INL Site facilities, natural radioactivity, and global fallout from historical nuclear detonations or nuclear accidents are collected on- and off-Site using low-volume samplers and 2-in. filters. Potential gaseous iodine releases are monitored using activated charcoal cartridges. Atmospheric moistureis collected using digital flow meters and molecular sieves per LI-351, *Sampling Atmospheric Tritium*[38] to monitor for tritium in water vapor (Figure 4-3)

4.1.2 ICP Contractor

The ICP contractor measures airborne radionuclides and monitors for potential trends in radioactivity in the environment per ICP PLN-720, "Environmental Surveillance Program Plan"[28]. The ICP ambient air monitoring activities support the waste management facility requirements of DOE Order 435.1[3]. A series of samplers that monitor for radioactive particulates is used around the RWMC SDA and at the Idaho CERCLA Disposal Facility (ICDF). Airborne materials from the SDA and ICDF are predominantly fugitive dusts potentially contaminated with small amounts of sorbed radionuclides. The samplers are located along the periphery of the SDA in predominant wind paths from disposal activities and at a control location north of Howe, Idaho.

4.1.3 ESER Program

The ESER Program conducts ambient air monitoring both on-Site and off-Site using a variety of monitors to determine if there is a gradient in radionuclide concentrations between the INL Site and off-Site locations. These monitors include:

- A network of low-volume air samplers on and around the INL Site to collect particulate matter on filters, and gaseous radioiodine on cartridges. Placement of these samplers is based on DOE regulatory guidance to monitor population centers within 50 miles, atmospheric transport and diffusion patterns modeled by NOAA ARLFRD, and on public interest. Filters are analyzed weekly for gross alpha/beta emitting activity and composited quarterly for analysis for gamma-emitting and specific alpha-emitting and beta-emitting radionuclides.
- A high-volume air sampler in Idaho Falls is operated as part of the EPA's RadNet Program, which monitors environmental radioactivity across the U.S. to provide high-quality data for assessing public exposure and environmental impacts resulting from nuclear emergencies and baseline data during routine operations. The sampler collects real-time data on gross beta and gamma activity, which EPA monitors from their RadNet headquarters. Filters are also collected biweekly from the Idaho Falls sampler by the ESER Program and are shipped to an EPA laboratory where they are analyzed for gross radioactive activity and concentrations of specific radionuclides. Results can be found at http://www.epa.gov/enviro/html/erams.
- Four atmospheric moisture monitors located in Atomic City, Blackfoot, Idaho Falls, and Sugar City, which collect water vapor samples for tritium analysis (Figure 4-3).

The ESER Program also collects precipitation samples to measure tritium in air. One sampler is located in Idaho Falls as a control or background sampler, and two others are located at the INL Site, one at CFA and the other at the Experimental Field Station near INTEC (Figure 4-4). The Idaho Falls station is operated as part of the EPA's RadNet Program. Ambient air monitoring locations, frequencies, methodologies, and analytes are specified in the ESER Environmental Program procedures[39].

4.2 Drinking Water

Groundwater supplies the drinking water systems at the INL Site, and drinking water is monitored according to regulations to ensure that the drinking water at the facilities is safe for consumption in accordance with IDAPA 58.01.08, "Idaho Rules for Public Drinking Water Systems"[40] and Public Law 104-182, *Safe Drinking Water Act*[41]. All on-Site contractors participate in the INL Drinking Water Program as a means of sharing information, but each contractor administers its own drinking water monitoring program. Because of known contaminants, certain parameters are monitored more frequently than required.

Monitoring is based on the classification and size of the water systems (i.e. transient or nontransient noncommunity). Off-Site drinking water systems are also monitored by the ESER program due to the potential for contaminant migration beyond the Site boundary and are collected from taps. Samples collected off-Site are included as drinking water samples, but are not used for compliance with drinking water regulations. Instead, they are used to assess groundwater quality. Section 4.3 discusses the groundwater monitoring samples taken directly from wellheads.

Transient, noncommunity water systems on the Site are the CITRC, EBR-I, Gun Range, Test Area North/Technical Support Facility and the main gate. Nontransient, noncommunity water systems have more stringent compliance requirements than transient, noncommunity water systems. The nontransient, noncommunity water systems at the Site are INTEC, RWMC, CFA, ATR Complex, Test Area North/Contained Test Facility, and MFC.

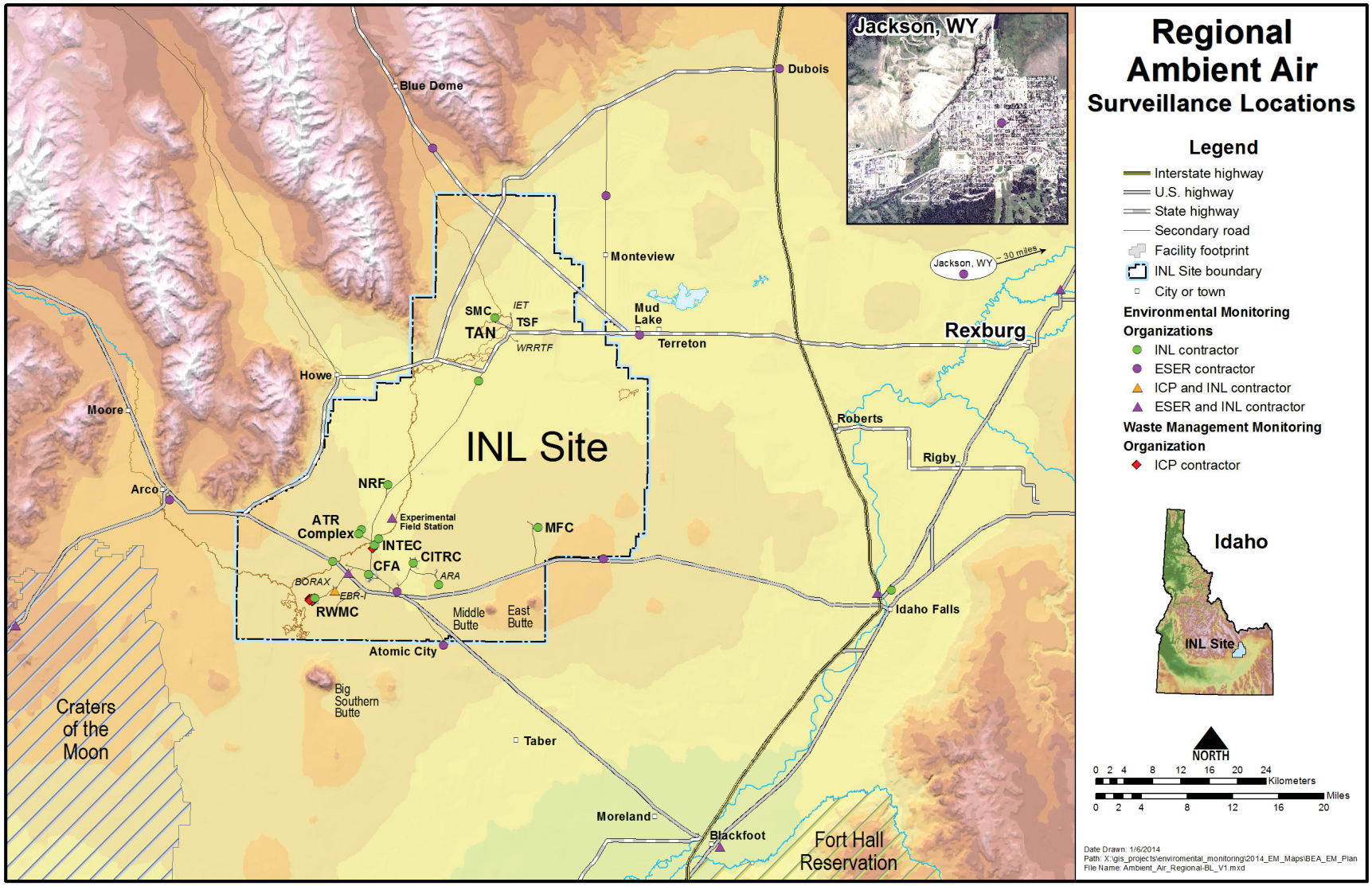

Figure 4-1. Regional ambient air monitoring locations.

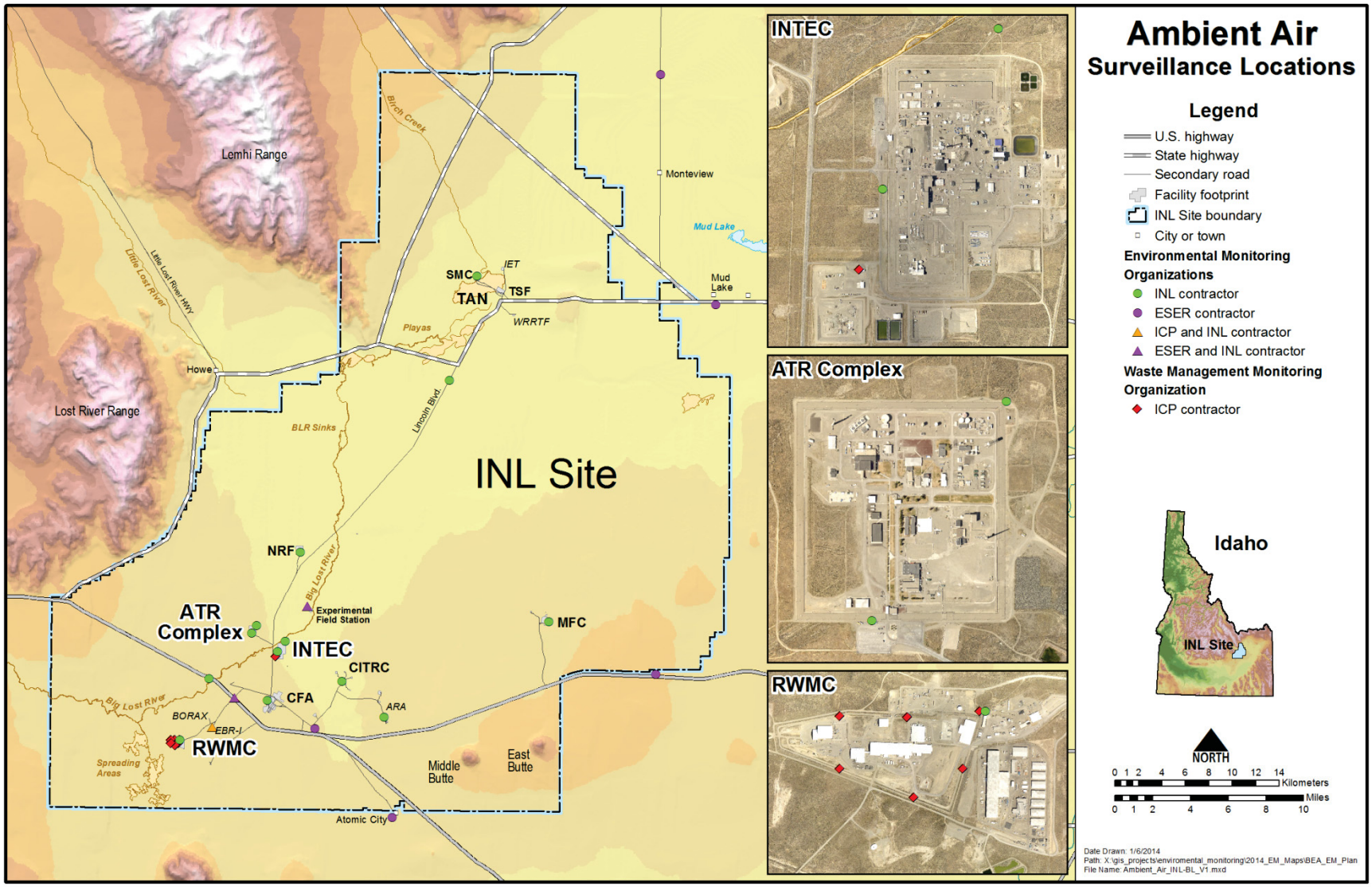

Figure 4-2. Detailed on-Site ambient air monitoring locations.

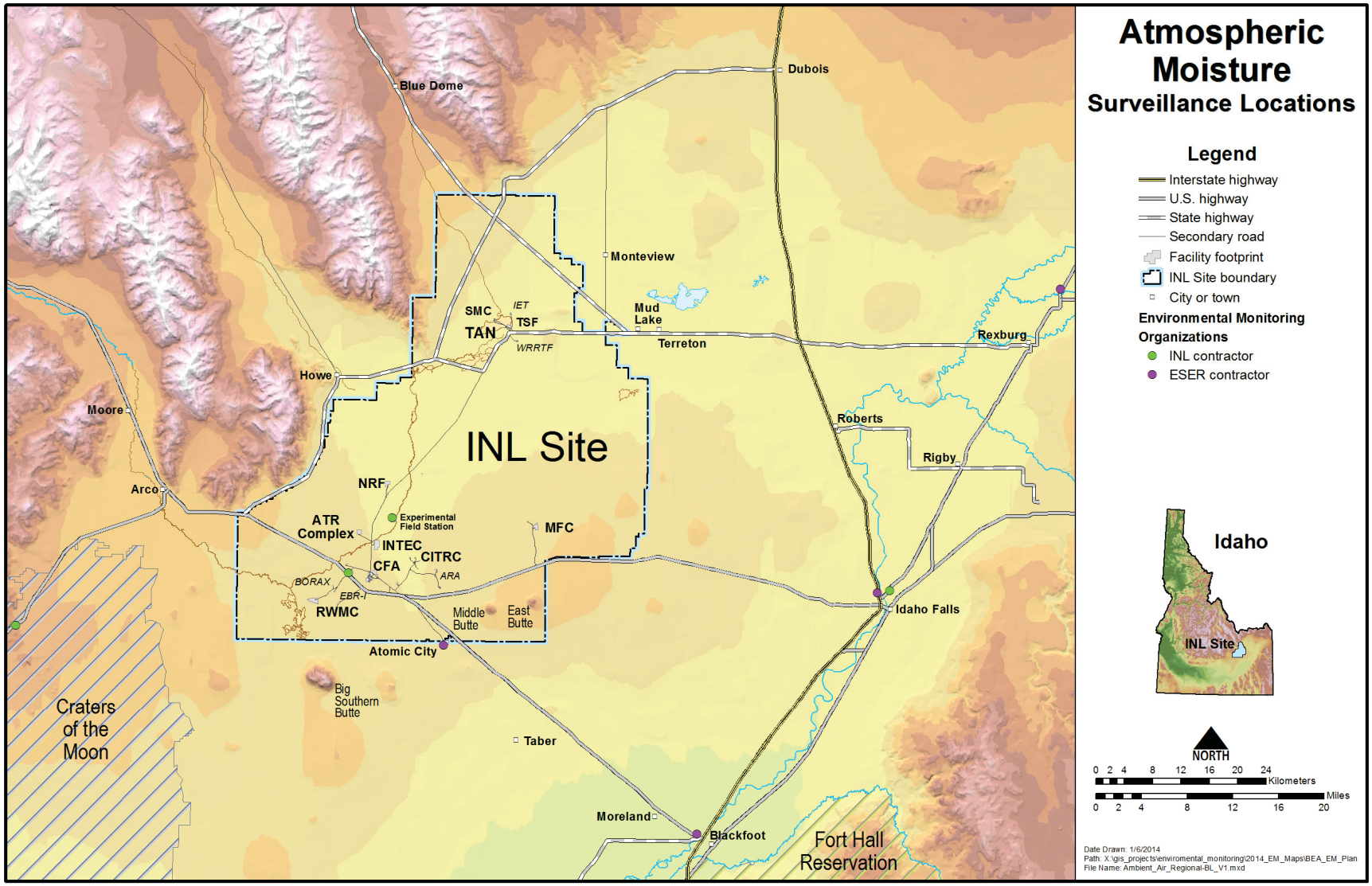

Figure 4-3. Atmospheric moisture monitoring locations.

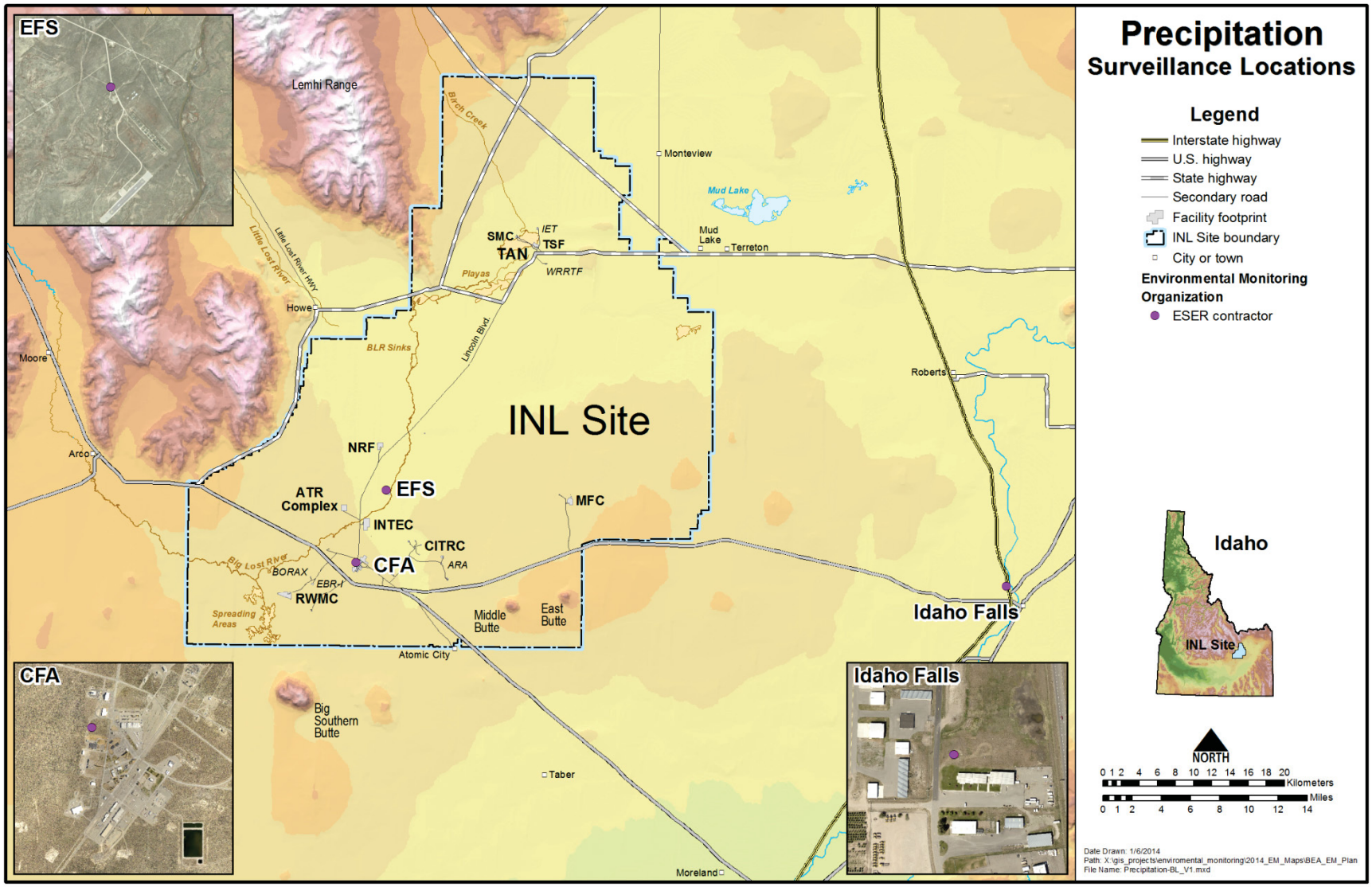

Figure 4-4. Precipitation monitoring locations.

Figure 4-5 shows regional drinking water monitoring locations. On-Site drinking water samples are collected from the point of entry to each distribution system or manifold, directly from the wellheads, and from buildings associated with each drinking water distribution system. Figure 4-6 shows the detailed locations of those manifolds and wellheads that are currently monitored across the INL Site. Individual sampling points from each drinking water distribution system are not shown on Figure 4-6 because these sample points include most buildings connected to the distribution system.

4.2.1 INL Contractor

The INL contractor performs all drinking water monitoring and is responsible for all site drinking water systems with the exception of INTEC and RWMC, which are ICP contractor facilities. Currently, the INL contractor monitors 17 wells and nine distribution systems across the Site for both radiological and nonradiological parameters. Sampling locations, parameters, and frequencies are documented in the PLN-8530, *Idaho National Laboratory Drinking Water Program Plan*[42], and associated procedures.

4.2.2 ICP Contractor

The ICP contractor monitors drinking water systems at INTEC and RWMC. The ICP contractor is responsible for regulatory compliance at these facilities. Sampling locations, parameters, and frequencies are documented in PLN-730, "Idaho Cleanup Project Drinking Water Program Plan"[43], and associated procedures.

4.2.3 ESER Contractor

The ESER contractor collects drinking water at Atomic City, Craters of the Moon, Howe, Idaho Falls, Minidoka, Mud Lake, Shoshone, and the public rest stop on Highway 20/26. The last location is the only public drinking water site located close to the mapped tritium plume from the INL Site. Howe is monitored because it is close to the INL Site boundary and the Big Lost River Sinks.

The water at Atomic City, Minidoka, Mud Lake and Shoshone are is co-located with the state of Idaho Department of Environmental Quality INL Oversight Program. A subsample of the Idaho Falls sample is sent to EPA for analysis as part of the EPA RadNet program. These samples are all distant from the INL Site groundwater plume but are of interest to the public.

The Craters of the Moon and Idaho Falls locations are outside the influence of the groundwater plume and are used for background comparison with the other sites.

All samples are analyzed for gross alpha/beta activity and tritium.

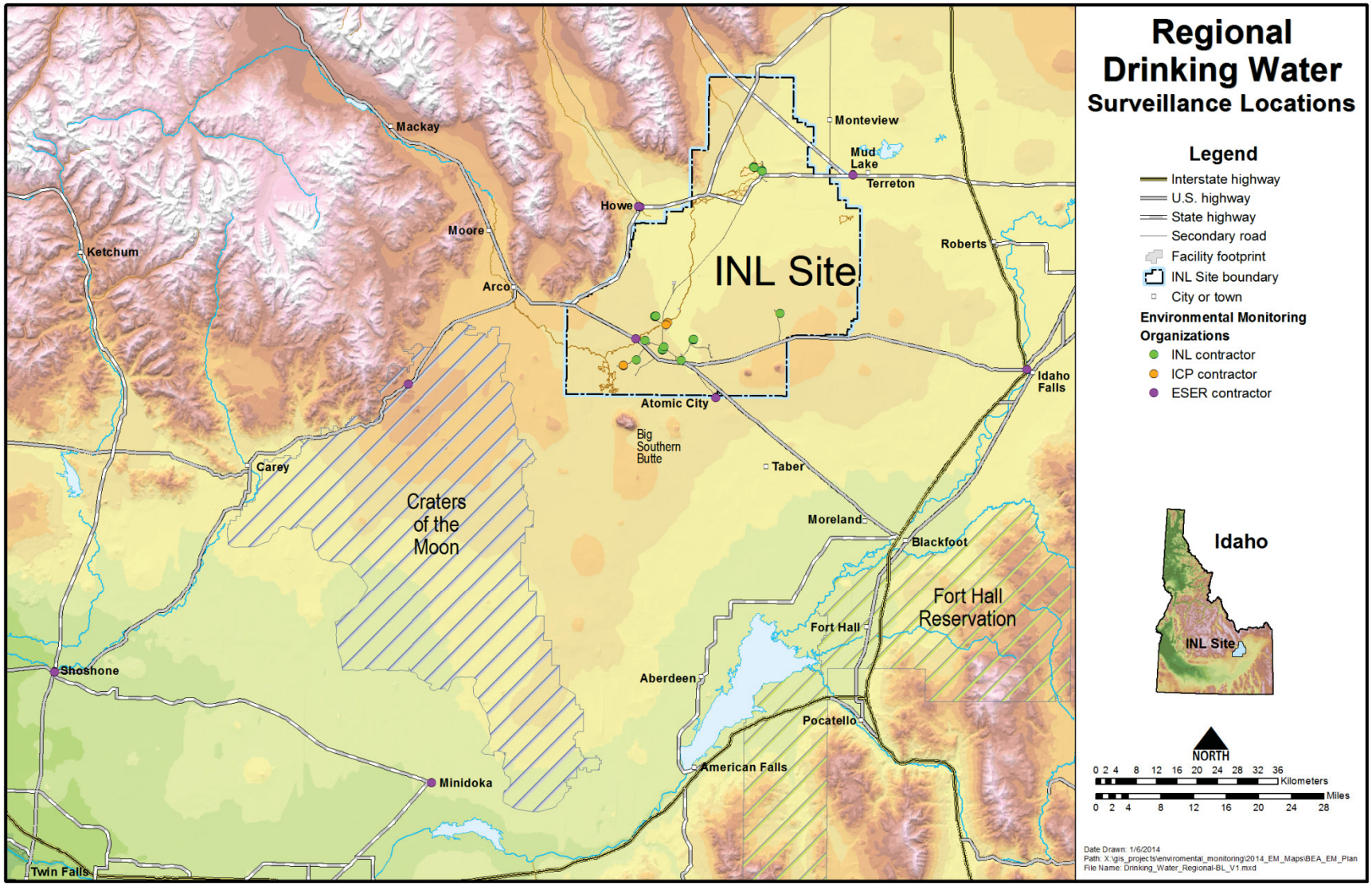

Figure 4-5. Regional drinking water monitoring locations.

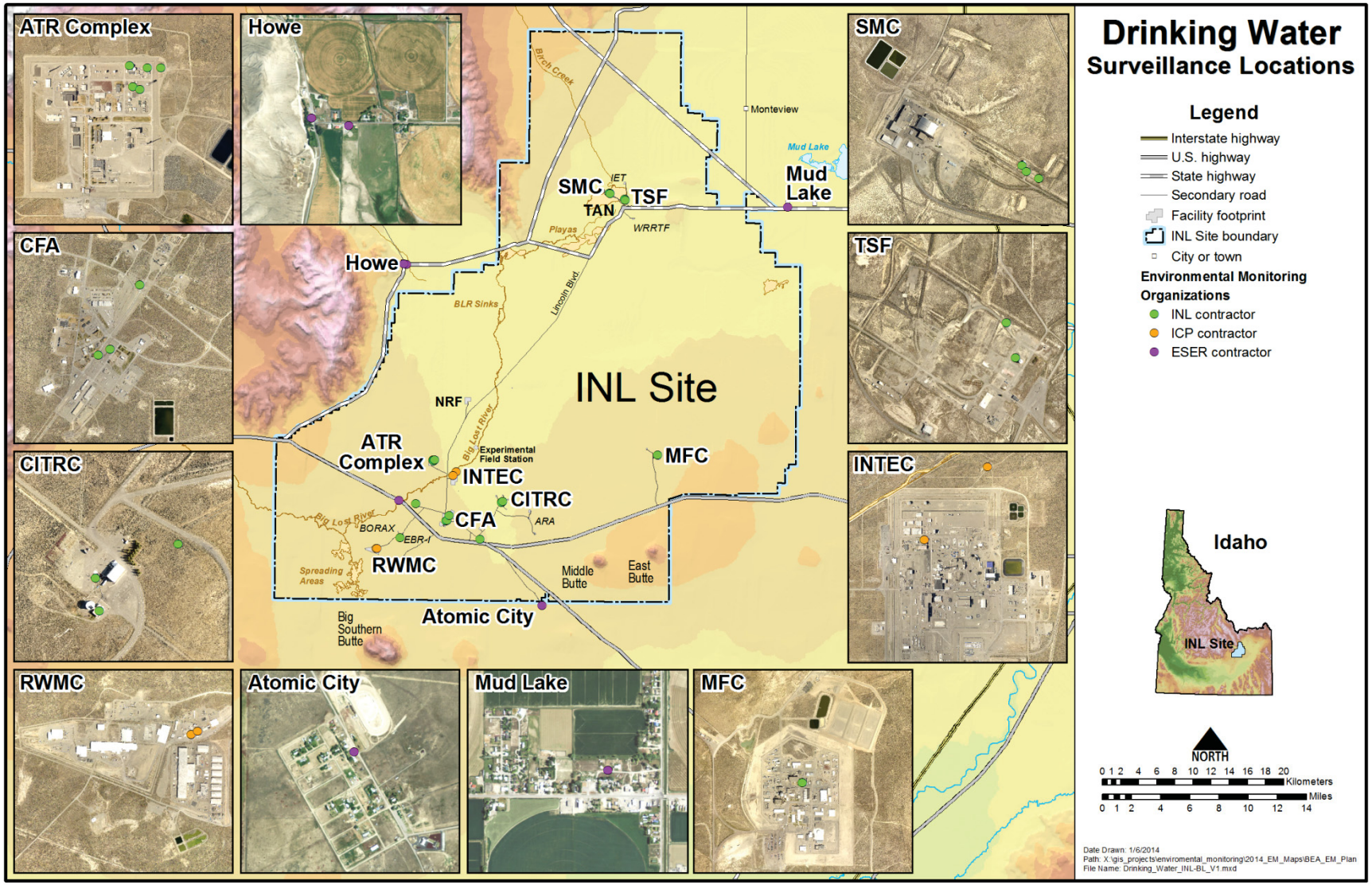

Figure 4-6. Detailed on-Site drinking water monitoring locations.

4.3 Groundwater

Historic waste disposal practices have produced localized areas of contamination in the ESRPA beneath the INL Site. The ESRPA is the source of regional drinking water and supplies irrigation water to a large, regional agricultural and aquaculture economy. On-Site groundwater samples are taken from wells near each facility, in areas of known contamination, and regionally across the Site (including upgradient of Site operations). Contaminants resulting from past INL Site operations have been detected in the ESRPA beyond the Site's southern boundary at concentrations far below regulatory limits. Off-Site groundwater samples are taken downgradient of the INL Site near the INL Site boundary and near the terminus of the ESRPA.

Groundwater is currently monitored at the INL Site by multiple organizations to:

- Satisfy specific CERCLA-related remedial action objectives and/or regulatory requirements contained in RODs, RCRA regulations, WRPs, and DOE orders
- Determine the nature and extent of groundwater contamination during CERCLA remedial investigation/feasibility study activities
- Evaluate general groundwater conditions and contaminant fate and transport on a regional and subregional scale (as performed by the USGS and WAG 10).

The groundwater monitoring programs established by the contractors responsible for managing and operating INL Site facilities, at a minimum, address regulatory compliance and remediation goals at each of the facilities for which they have management responsibility. DOE/ID-11034, *Idaho National Laboratory Groundwater Monitoring and Contingency Plan*[44], provides an overview of the routine groundwater monitoring conducted on-Site and specifies how the recommended elements of a groundwater monitoring program under DOE Order 458.1[1] are met. All approved CERCLA documents and associated groundwater monitoring activities can be found in the Administrative Record/Information Repository at ar.inel.gov.

4.3.1 INL Contractor

The INL contractor is responsible for groundwater monitoring at MFC per the CERCLA ROD and the WRP for the Industrial Waste Ditch and Pond, and at the ATR Complex in compliance with the WRP for the Cold Waste Pond.

4.3.2 ICP Contractor

Except for MFC and NRF, the ICP contractor is responsible for groundwater monitoring conducted at all other CERCLA site monitoring locations, WRP compliance at INTEC, and RCRA post-closure monitoring at INTEC's Waste Calcining Facility and CPP-601/627/640 Landfill. The ICP contractor currently performs data interpretations to determine the cumulative impact of CERCLA sites at the INL Site.

4.3.3 USGS

USGS monitors ESRPA wells within its defined regional network (both on-Site and at boundary locations) to study contaminant migration and determine groundwater quality and quantity as they relate to Site operations. The Site boundaries are monitored to detect groundwater contaminants entering and leaving the INL Site. Wells within the Site boundary are monitored to evaluate contaminant movement in the ESRPA between facilities.

Each monitoring well in the USGS regional network is monitored for the contaminants of concern specific to its locale and known or suspected contaminant sources. In general, on-Site ESRPA wells outside of facility fences are sampled by the USGS annually, depending on location. Samples are routinely collected and analyzed for radionuclides, volatile organic compounds, trace elements, and

anions. Sampling locations, methodologies, and parameters are specified in DOE/ID-22206, *Field Methods and Quality Assurance Plan for Quality-of-Water Activities, US Geological Survey, Idaho National Laboratory, Idaho*[45].

4.4 Surface Water

The Big Lost River system includes the Little Lost River, Big Lost River, Birch Creek, and associated tributary channels, playas, and sinks. No streams or rivers flow from within the Site to locations outside the boundaries, and most years, the channels of the Big Lost River system on the INL Site are dry. However, surface water samples are taken when water is present both on and around the Site to monitor the surface water pathway. Currently, there are no discharges of storm water or liquid effluent from INL Site facilities that require monitoring under 33 USC § 1251, *Federal Clean Water Act*[46]. Figure 4-7 shows all of the current on-Site and off-Site surface water monitoring locations.

4.4.1 ICP Contractor

Surface and near-surface soils at RWMC have become contaminated from waste handling and biotic intrusion during past flooding of open pits. Surface water runoff is sampled at the SDA because of the potential for surface water runoff to become contaminated. Sampling locations, parameters, and frequencies are documented in the ICP PLN-720[28] and associated procedures. These samples are collected to comply with the following objectives:

- Meet the requirements for waste management facility monitoring per DOE Order 435.1[3].
- Determine concentrations of radionuclides in surface water leaving the facility.
- Report comparisons of measured concentrations against derived concentration guides for the public. Derived concentration technical standards are calculated from DOE dose equivalent tables and based on DOE radiation protection standards given in DOE Order 458.1[1].
- Detect and report significant trends in measured concentrations of radionuclides in surface waters leaving the SDA with the potential of leaving the facility.

4.4.2 ESER Contractor

Surface water is sampled on the Big Lost River (BLR) through the INL Site, as it has the potential to carry contaminated soil to the BLR Sinks. The samples are analyzed for gross alpha/beta activity and tritium. In addition, gamma spectroscopy is performed on these samples, as cesium (Cs)-137 is a major soil contaminant at the INL Site.

Samples are collected semiannually at five locations along the BLR, from the Highway 20/26 to the BLR Sinks, when water is available.

Surface water is also collected semiannually at locations downgradient of the BLR Sinks at Buhl, Hagerman, and Twin Falls. These locations are co-sampled with the state of Idaho Department of Environmental Quality INL Oversight Program and are analyzed for gross alpha/beta activity and tritium.

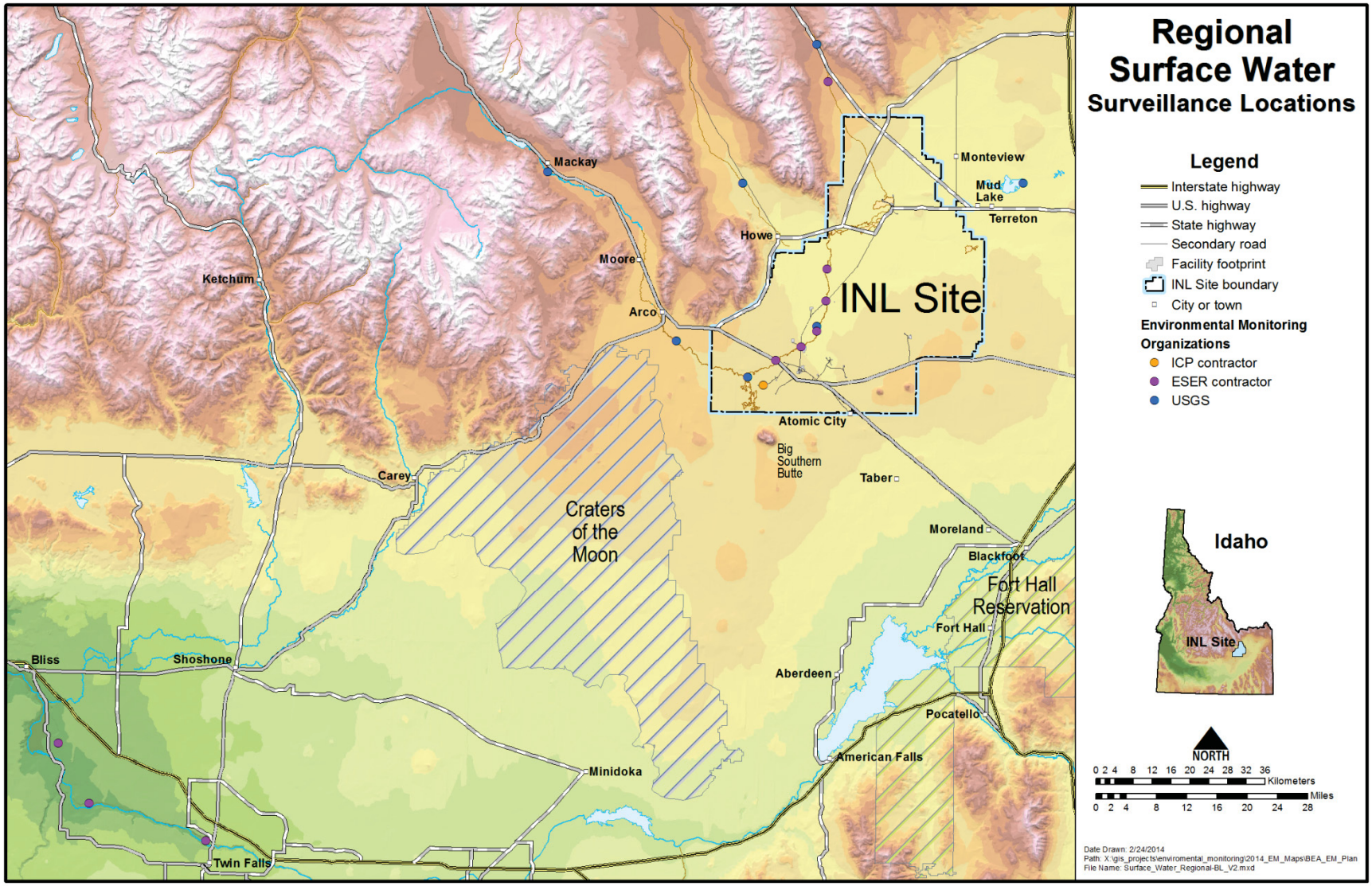

Figure 4-7. Regional surface water monitoring locations.

4.4.3 USGS

When flow occurs in the Big Lost River or other selected streams, surface water samples are collected annually and submitted for radionuclide and chemical analyses to determine the effect that surface water flow has on the chemistry of groundwater beneath the Site.

The USGS takes surface water samples from Birch Creek, the Little Lost River, and Mud Lake, and from four locations on the Big Lost River. The Big Lost River on-Site sampling locations include the INL Diversion Dam near RWMC and the Experimental Field Station near INTEC. The off-Site sampling locations are located near Mackay and Arco. Details on the surface water sampling performed by the USGS are specified in DOE-ID-22206[45].

4.5 Soil

Some INL Site soils have been contaminated by radioactive and nonradioactive effluents from INL Site operations and from nuclear weapons testing fallout. Soil sampling is conducted at the Site to:

- Determine present concentrations of nonradioactive contaminants and radioactivity (natural and anthropogenic) in soil
- Identify and quantify changes in contaminant concentrations in the soil caused by INL Site operations
- Comply with regulatory requirements
- Provide data used to calculate fugitive air emissions.

Figure 4-8 shows regional soil monitoring locations, and Figure 4-9 shows detailed on-Site soil monitoring locations.

4.5.1 INL Contractor

The INL contractor conducts soil sampling in compliance with DOE Order 458.1[1] requirements for monitoring to determine the impacts of operations on the environment and public health, and for compliance with the WRP for the CFA STP irrigation area.

Soil monitoring activities are conducted primarily to determine if long-term deposition of airborne materials released from INL Site facilities have resulted in a build-up of radionuclides in the environment. Soils are analyzed on a yearly rotation schedule around all INL Site facilities and regionally using portable in situ gamma spectrometers capable of detecting gamma-emitting radionuclides. A subset of these locations shown in Figures 4-8 and 4-9 are monitored on an annual basis to provide a radiological baseline for gamma-emitting radionuclides in soils. Roadways and Site facility perimeters are monitored on an annual basis using vehicle-mounted radiation detectors. These systems provide background-corrected count rate and isotopic concentration data, which is mapped for each measured roadway or facility perimeter. Geostatistical and trend analyses are performed on the radiological data to evaluate the soil radionuclide concentrations over time at the INL Site.

Soil samples taken in support of the CFA STP WRP are analyzed for nonradiological contaminants to determine the effect of wastewater irrigation on soil chemistry. These soil samples are collected in accordance with the permit and company-controlled procedures.

4.5.2 ICP Contractor

The ICP contractor conducts soil sampling in compliance with DOE Order 435.1[3]. Locations of soil samples taken at the RWMC are selected from specific areas at the SDA. Surface and near-surface soils at RWMC have become contaminated from past flooding of open pits, waste handling, and biotic intrusion. Soil sampling is performed because wind, water, and biota can transport contaminated soil particulates on-Site and off-Site. The areas at the SDA delineated for sampling include active areas, Pad A, inactive

areas, and previously flooded areas. Soil samples are collected at the SDA every three years. Details of this sampling can be found in ICP PLN-720[28].

Soil sampling is performed as required by the remedial investigation/feasibility study (RI/FS) activities, RODs, and as part of the CERCLA Long-Term Ecological Monitoring Program to verify that the remedial objectives of each CERCLA ROD are maintained and that the long-term INL Site-wide ecological impact of the contamination left in place remains within acceptable limits.

Under the CERCLA Long-Term Ecological Monitoring Program, soil samples will be taken at locations identified as sites of concern and will be monitored for both radiological and nonradiological contaminants. Soil samples will be collected from the surface to no more than 0.61 m (2 ft) below ground surface and will consist of composites from locations within the sampling plots that correspond to plants from which vegetation samples are collected. This depth is anticipated to concentrate sampling and analytical efforts on the depth most likely to pose a source of contamination to plant roots and ingestion/physical exposures to surface dwellings and burrowing animals. These soil samples are collected in accordance with INEEL/EXT-02-01191, *Long-term Ecological Monitoring Plan for the Idaho National Engineering and Environmental Laboratory*[47]. Because the locations of this monitoring can be extensive and vary within each site of concern, the actual sampling locations are not depicted on the soil figures.

The ICP contractor performs additional monitoring to comply with EXT-95-00496, *Record of Decision Declaration for Central Facilities Area Landfills I, II, and III (Operable Unit 4-12), and No Action Site, (Operable Unit 4-03)*[48], and to support ongoing work for a WAG 7 RI/FS of RWMC areas. At CFA, moisture content in the soil is monitored by neutron access tubes adjacent to the landfills; moisture infiltration through the soil cover of the landfills is monitored using time-domain reflectometry arrays; and soil gas is monitored through a series of soil-gas sampling ports at varying depths adjacent to the landfills in accordance with Idaho National Engineering Laboratory (INEL)-95/0585, *Field Sampling Plan (FSP) for Post-Record of Decision (ROD) Monitoring for the Central Facilities Area (CFA) Landfills I, II, and III Under Operable Unit (OU) 4-12*[49].

At RWMC, soil moisture and soil gas are monitored to support the WAG 7 CERCLA activities. The data collected for WAG 7 are also used to satisfy the requirements of DOE Order 435.1[3]. Soil moisture monitoring in the vadose zone using lysimeters at RWMC is addressed in Section 4.3.2. Soil gas is sampled in the waste zone using vapor probes placed directly in the waste at selected locations. Soil gas is sampled in the vadose zone using an extensive system of soil gas sampling ports inside and outside the SDA boundary. Figure 4-10 shows the soil gas and soil moisture monitoring locations.

4.5.3 ESER Contractor

Soil samples are used to establish background levels of radionuclides (both natural and those resulting from fallout from nuclear weapons testing) and to detect any long-term buildup of radionuclides from the INL Site in off-Site soils. Soil is taken from 12 off-Site locations during even-numbered years for Sr-90 and transuranic and gamma-emitting radionuclide analyses. Co-sampling is conducted with the state of Idaho Department of Environmental Quality INL Oversight Program at St. Anthony, Mud Lake, Monteview, Butte City, Carey, and Crystal Ice Caves. Details on the soil sampling performed by the ESER Program are specified in the ESER Environmental Program soil sampling procedure[39].

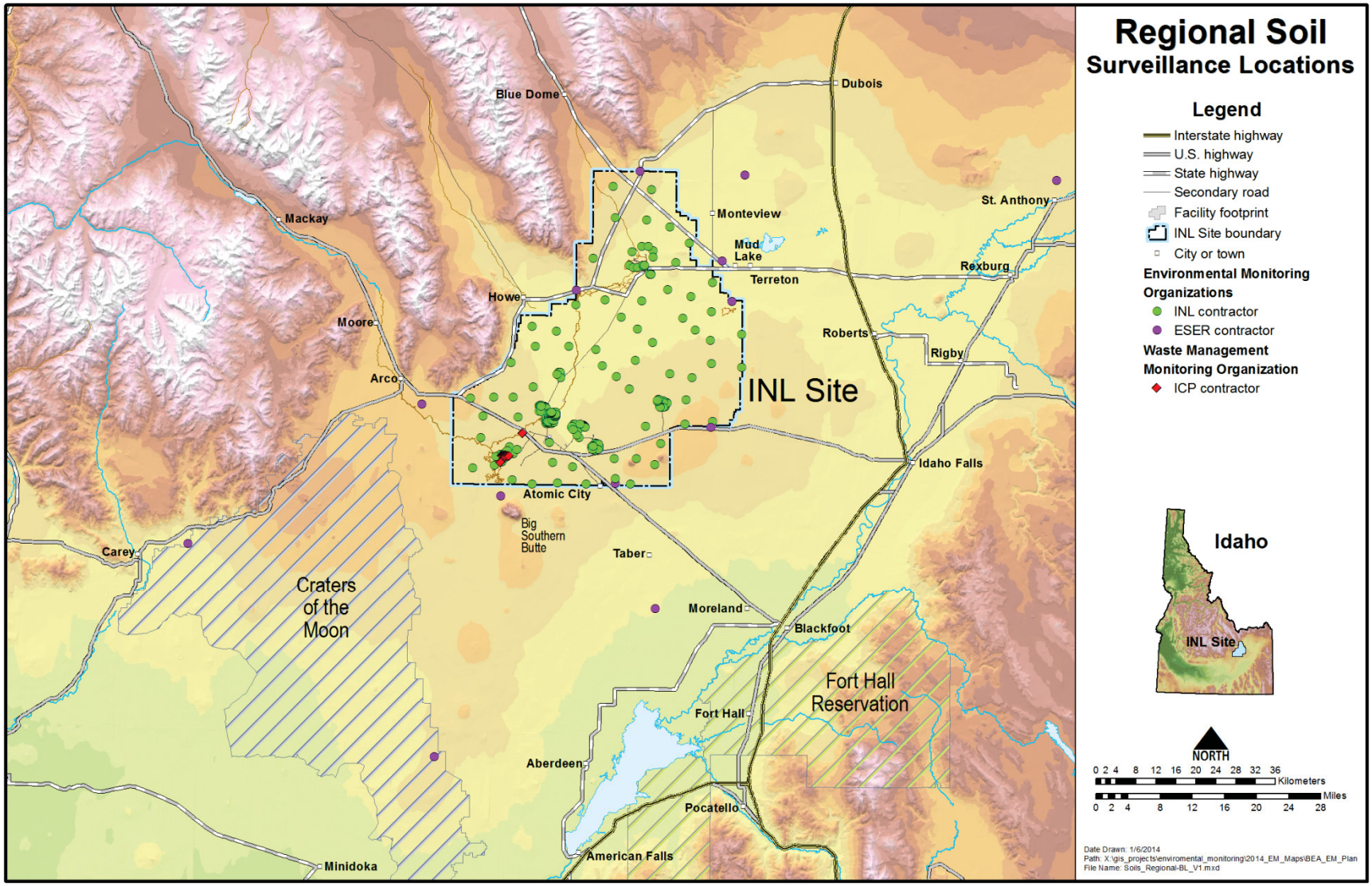

Figure 4-8. Regional Soil monitoring locations.

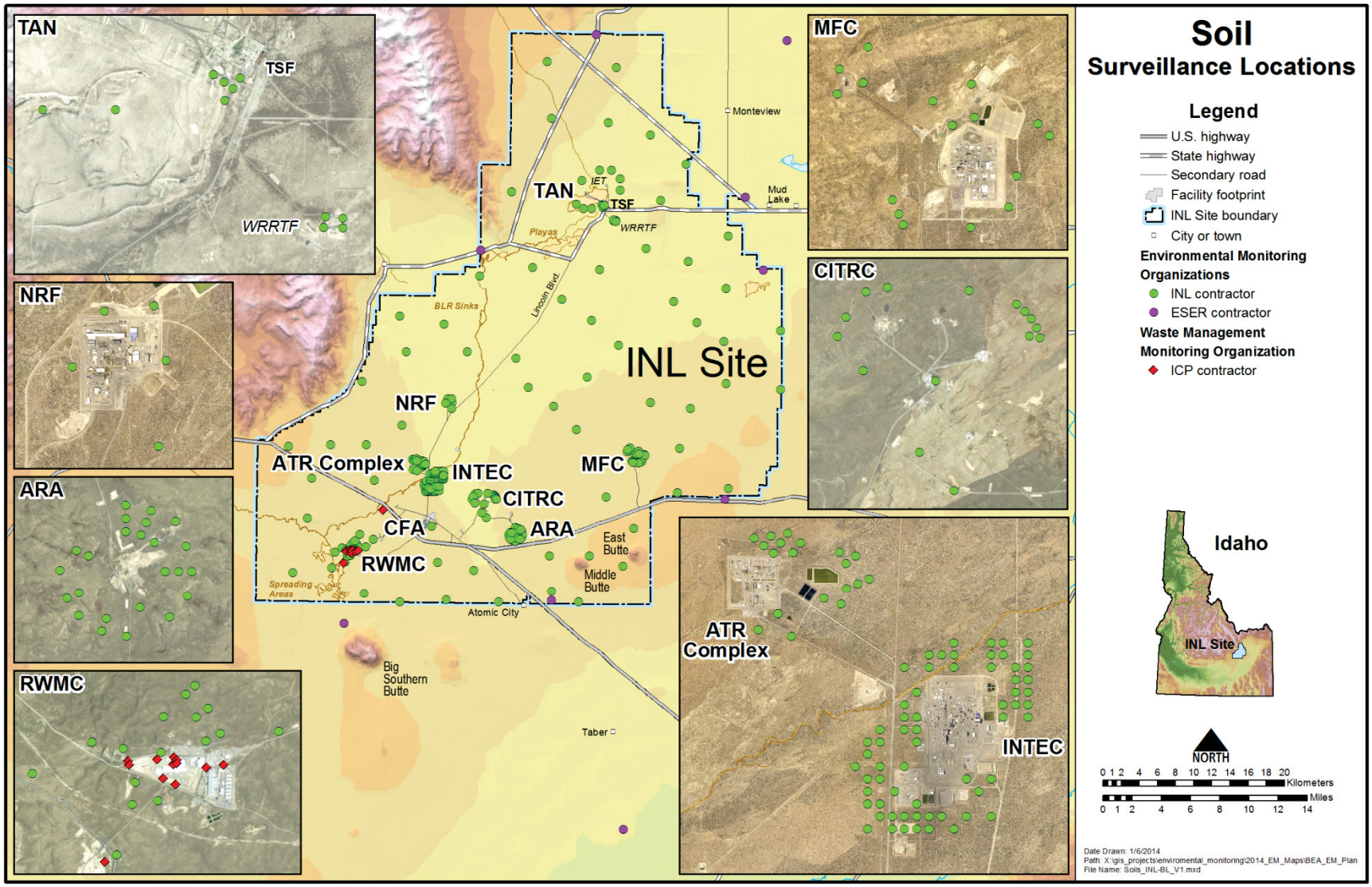

Figure 4-9. Detailed on-Site soil surveillance locations.

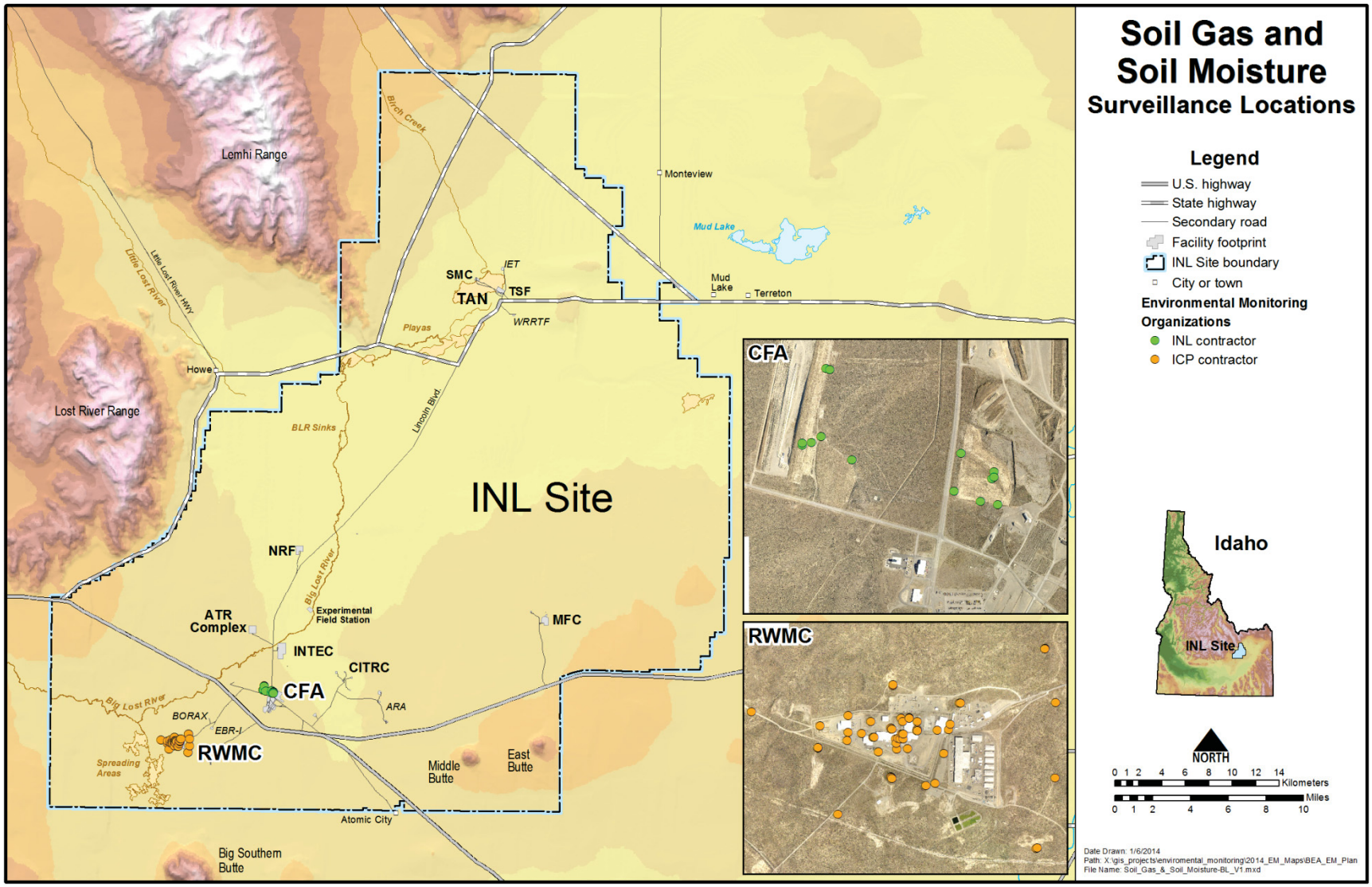

Figure 4-10. Soil gas and soil moisture monitoring locations.

4.6 Biota

Plants represent the major linkage in transfer of soil-borne contaminants to primary consumers and higher trophic levels. The leaves, florets, and shoots of plants can accumulate constituent concentrations caused by wind-blown contamination and uptake from the soil. Belowground plant components can also accumulate certain contaminants, although most birds and mammals are expected to consume primarily aboveground components. Plants are sampled to determine potential migration of facility contaminants and to ensure waste confinement integrity.

Wildlife has access to some areas on the Site containing radioactive contamination. Because wildlife has the potential to move off-Site and be harvested by the public for consumption, wildlife is sampled to document levels of radioactivity in the edible tissues. Small mammal species are sampled to determine long-term ecological impacts of contamination and assess waste confinement integrity. Figure 4-11 shows the biota monitoring locations.

4.6.1 ICP Contractor

The ICP contractor performs both CERCLA and non-CERCLA biota sampling activities. Routine non-CERCLA monitoring is performed to:

- Determine if biota are transporting radionuclides from buried waste or contaminated soil
- Identify biotic conditions that may compromise waste confinement at waste storage and disposal facilities
- Detect and report significant trends in the radionuclides and concentrations in biotic samples.

Plants at the RWMC SDA are sampled to comply with DOE Order 435.1[3] and to monitor waste confinement integrity because radionuclides may migrate away from the facility. Vegetation is collected from a control location approximately 11 km (7 mi) south of RWMC and from four representative areas at the RWMC SDA. These include active areas, Pad A, inactive areas, and previously flooded areas. Non-CERCLA plant monitoring is conducted as described in ICP PLN-720[28] and associated procedures. Three composite samples are collected from each of the four representative areas as follows: crested wheatgrass in odd-numbered years, Russian thistle in even-numbered years, and either rabbitbrush or sagebrush (perennials) in odd-numbered years. All biotic samples are analyzed by gamma spectrometry. Radiochemistry is performed on at least one sample from each of the major areas.

Biota sampling is performed as part of the CERCLA Long-Term Ecological Monitoring Program to verify that the remedial objectives of each CERCLA ROD are maintained and that any contamination left in place remains within acceptable limits. Vegetation harvested at each selected location includes leaves, small stems, and inflorescences for sagebrush, and leaves, culms, and inflorescences for grass. The intent of this sampling is to gather the plant material most likely to be browsed by herbivores.

Selected mammal species are obtained and analyzed for metals, explosive compounds, and radionuclide activity. Biota samples are collected on an annual basis at locations identified as sites of concern; actual sample locations are not depicted on Figure 4-11 because they can be extensive and vary within each area. These samples are monitored for both radiological and nonradiological contaminants. Sampling activities are conducted in accordance with INEEL/EXT-02-01191[47].

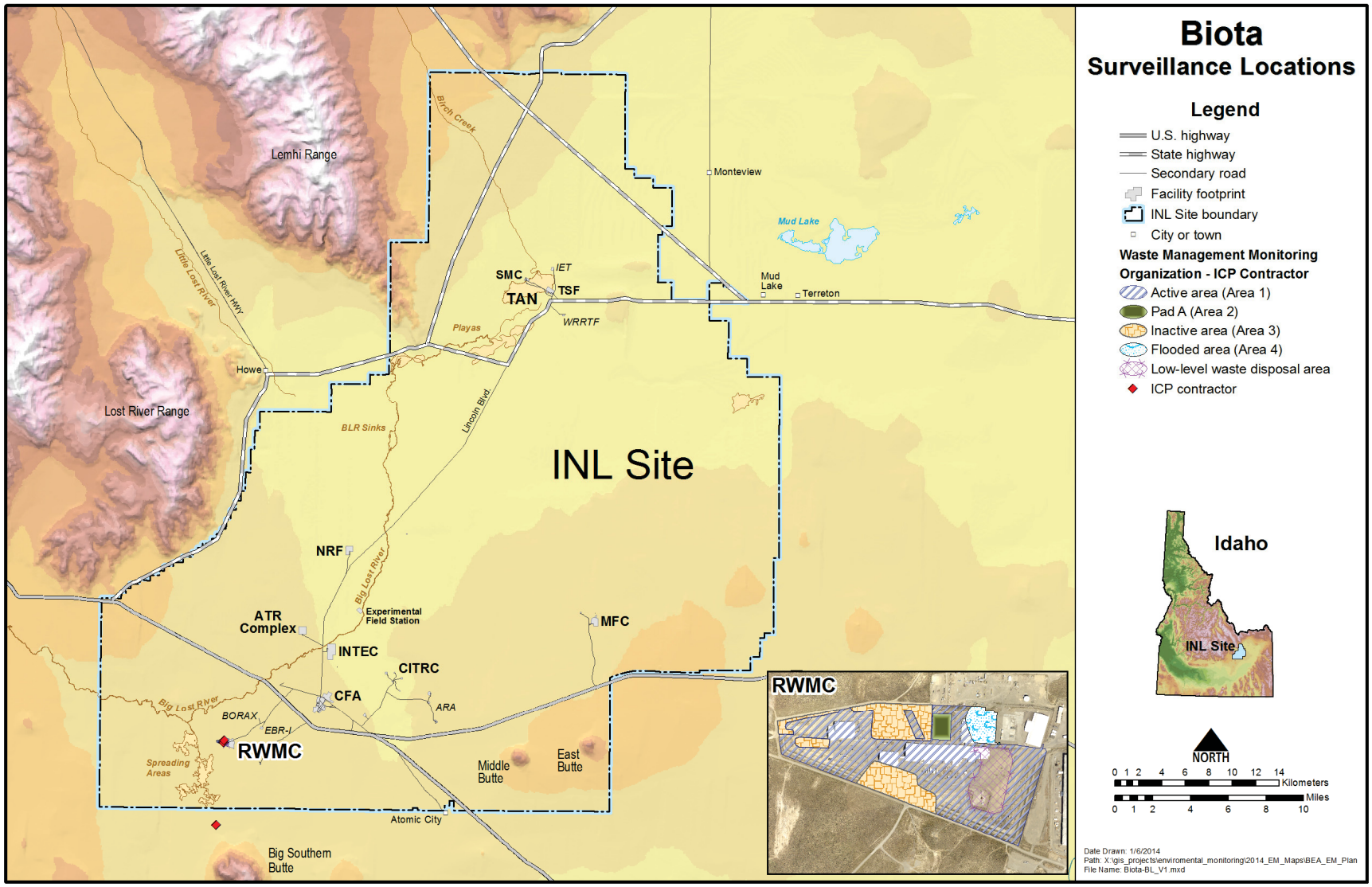

Figure 4-11. Biota monitoring locations.

4.6.2 ESER Contractor

Because large game animals (pronghorn, mule deer, and elk) are wide ranging and are a popular food source for many area residents, the ESER Program collects samples of game animals that are killed on roadways on or near the Site. The collection of large game animal samples is described in the ESER Environmental Program large game animal sampling procedures[37]. The thyroid and samples of muscle and liver tissue are collected from each animal and analyzed for radioactivity. Figure 4-12 shows locations where ESER big-game samples have been collected in the past. These locations vary from year to year depending on the numbers and locations of big-game/motor vehicle accidents.

The ESER Program also collects waterfowl on an annual basis from liquid waste disposal ponds on the Site and from off-Site control areas. Ponds sampled may include the MFC Industrial and Sanitary Sewage Lagoons, ATR Complex sewage lagoon, and an off-Site location. Past results indicate waterfowl may use the hypalon-lined pond at ATR Complex, but no sampling is conducted there. Edible tissues, viscera and remaining tissues (feathers, skin and bones) from waterfowl are each analyzed for gamma-emitting radionuclides.

Ecological studies, such as population surveys (on birds and mammals) and community structure surveys (on soil, fauna and plants) are performed by the ESER Program at varying times during the year as described in Section 4.9 (Figure 4-13).

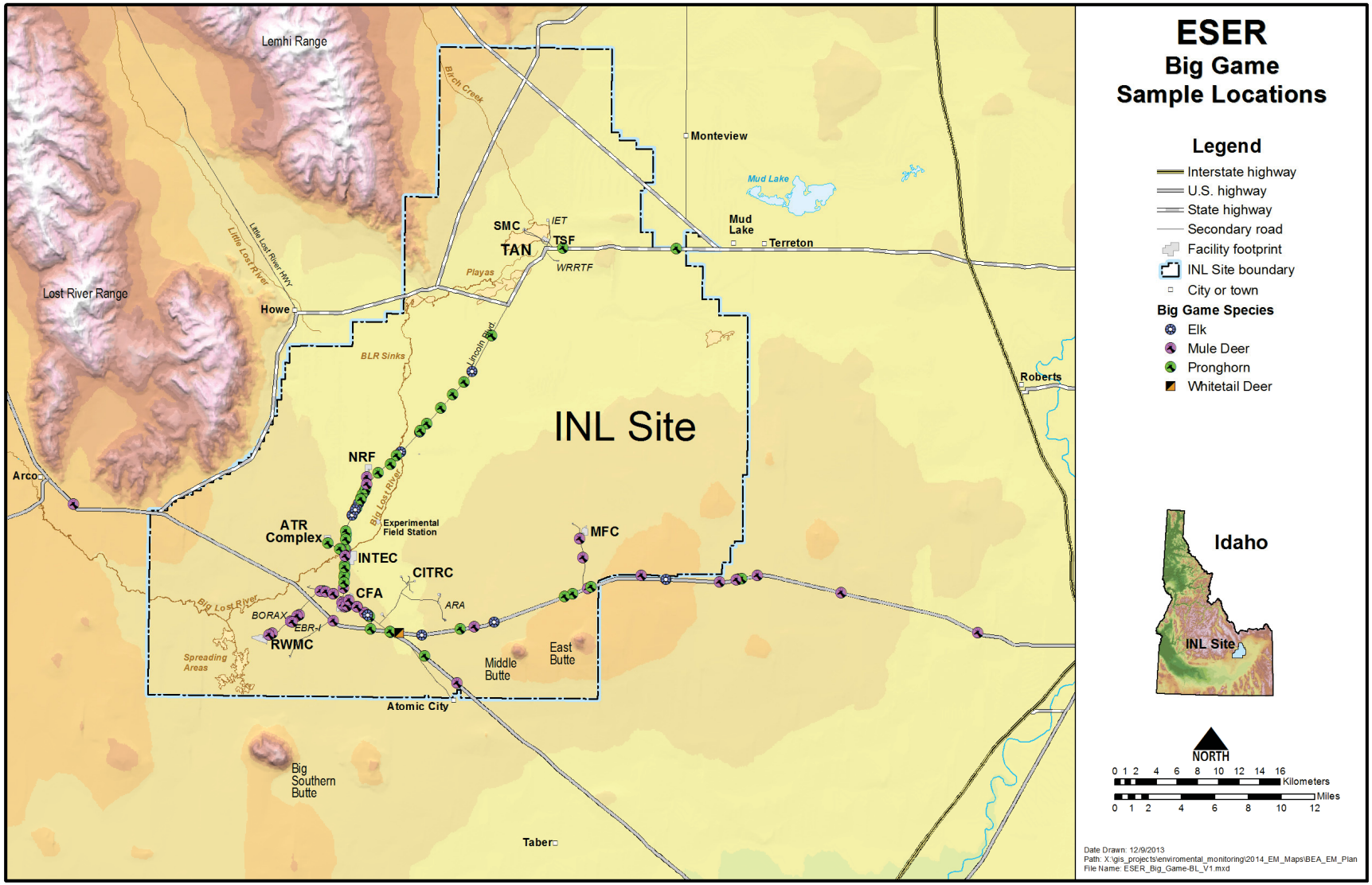

Figure 4-12. ESER big game sample locations.

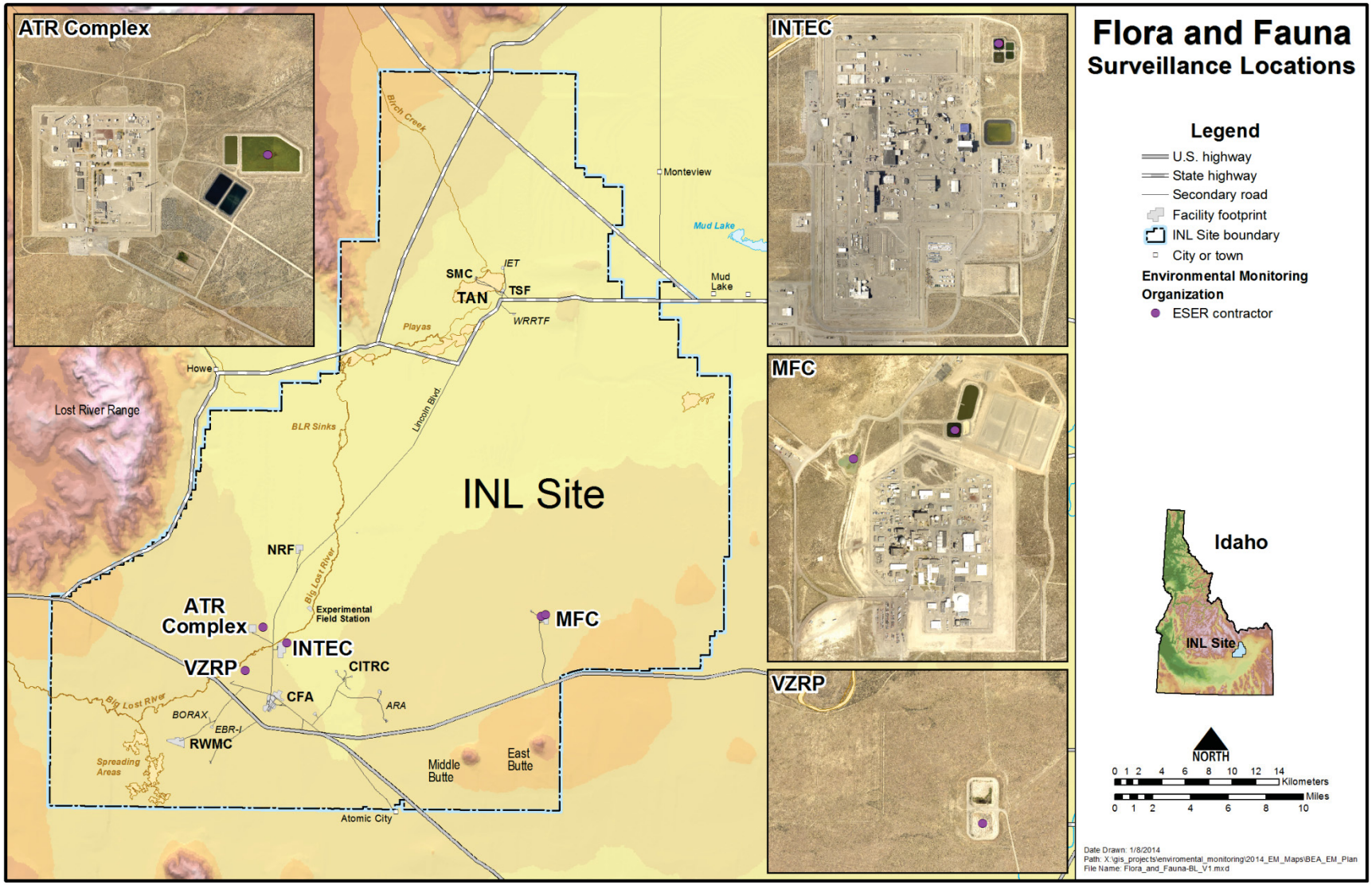

Figure 4-13. Flora and fauna monitoring locations.

4.7 Agricultural Products

The INL Site is located in a large agricultural area that produces products that are economically important to the state. These food products are monitored because they are a direct route of human exposure through ingestion. Milk, meat, and produce may become contaminated via atmospheric deposition, irrigation using contaminated water, and livestock ingesting contaminated water or feed. Figure 4-14 shows the locations where agricultural products are monitored. The ESER Program performs most of the agricultural monitoring in the vicinity of the INL Site. The agricultural products monitored are chosen because they are commonly consumed and are readily available for radionuclide analysis. The ESER Environmental Program procedures for milk, lettuce, wheat, potatoes, and alfalfa sampling provide details for the collection and processing of agricultural products[40].

4.7.1 Milk

Milk is monitored at off-Site locations because it is a potential pathway to the public for radioactive materials from the INL Site activities, particularly radioiodine and strontium-90. Some samples are taken from single-family dairies; others are taken from commercial dairies. A dairy in Idaho Falls is sampled weekly; the rest are sampled monthly.

4.7.2 Lettuce

Lettuce from portable lettuce growers and local gardeners is collected at selected locations annually to measure the uptake of radionuclides from soil and deposition from air and because they are a part of the typical diet. Lettuce is a broad-leaf crop which is known to be a good interceptor of radionuclides in airborne particulates. Samples are analyzed for gamma-emitting radionuclides and Sr-90.

4.7.3 Potatoes

Although potatoes were not generally considered to be as good an indicator of radionuclide uptake as leafy vegetables, routine potato sampling was resumed in 1994 due to public interest in Idaho's most famous product. Potato samples are obtained annually from warehouses in the vicinity of the Site during harvest. Potatoes are also obtained from friends and relatives living out of state from areas as distant as Maine and Alaska to serve as control samples.

4.7.4 Wheat

Wheat is sampled because it potentially represents a major part of the typical diet. Wheat samples are collected and processed from a number of areas in southeastern Idaho. These samples are collected annually during harvest time at local grain elevators.

4.7.5 Alfalfa

Because milk cows could eat hay potentially contaminated by releases from the INL Site, alfalfa is collected downwind of the INL Site from a rancher in Mud Lake. It is analyzed for gamma-emitting radionuclides.

4.8 External Radiation

External (or penetrating) radiation is measured using radiation dosimeters, pressurized ion chambers, and gamma radiation detectors at facilities, roadways, and surrounding communities. Sources of external radiation include natural radioactivity, cosmic radiation, fallout from nuclear weapons testing, radioactivity from fossil fuel burning, and radioactive effluents from INL Site operations. The contribution of INL Site operations to background radiation exposure is determined by comparing exposures measured at the Site boundary locations to those at distant locations. Figure 4-15 shows the

regional external radiation monitoring locations, and Figure 4-16 shows detailed on-Site monitoring locations.

Radiation monitoring is performed at the INL Site to:

- Characterize penetrating radiation levels at specific points of interest at waste management facilities and at the perimeter of Site facilities
- Detect and report significant trends in measured levels of penetrating radiation.

To meet these objectives, INL Site contractors measure gamma radiation exposure rates and cumulative exposures and perform gamma-radiation surveys both on-Site and off-Site.

Environmental dosimeters are used to measure cumulative exposures to ambient penetrating radiation for monitoring locations. The dosimeters measure changes in ambient exposures possibly attributed to handling, processing, transporting, or disposing radioactive waste. The dosimeters are located along major highways, in surrounding communities, and around the perimeter fences of each major facility. The dosimeters are placed 0.9 m (3 ft) above ground, and are collected and analyzed in May and November of each year to determine background exposures resulting from natural terrestrial sources, cosmic radiation, and fallout from testing nuclear weapons.

In addition to environmental dosimeters, a global positioning radiometric scanner (GPRS) system is used to conduct gamma-radiation surveys. These surveys measure gross gamma radiation and are used to identify general areas of radioactivity. They differ from the in situ soils analysis discussed in Section 4.5.1, which are used to identify specific radionuclides and activity levels. Gamma-radiation surveys are used to screen soils that have become contaminated with gamma-emitting nuclides and to detect penetrating radiation exposures outside the fenced areas from a variety of possible sources inside the facility.

The primary purpose of the ESER external radiation monitoring program is to assess the actual external radiation dose to an individual living at the INL Site boundary and to members of the public living beyond the INL Site boundary within 50 miles of any Site facility.

The GPRS is mounted on a four-wheel drive vehicle. Annual gamma-radiation surveys are conducted around the perimeter of selected facilities on an annual schedule to document penetrating radiation fields. Two plastic scintillation detectors identify contaminated areas, and both the global positioning system and radiometric data are recorded. Because these surveys involve facility perimeters, these monitoring locations are not displayed on either of the external radiation figures.

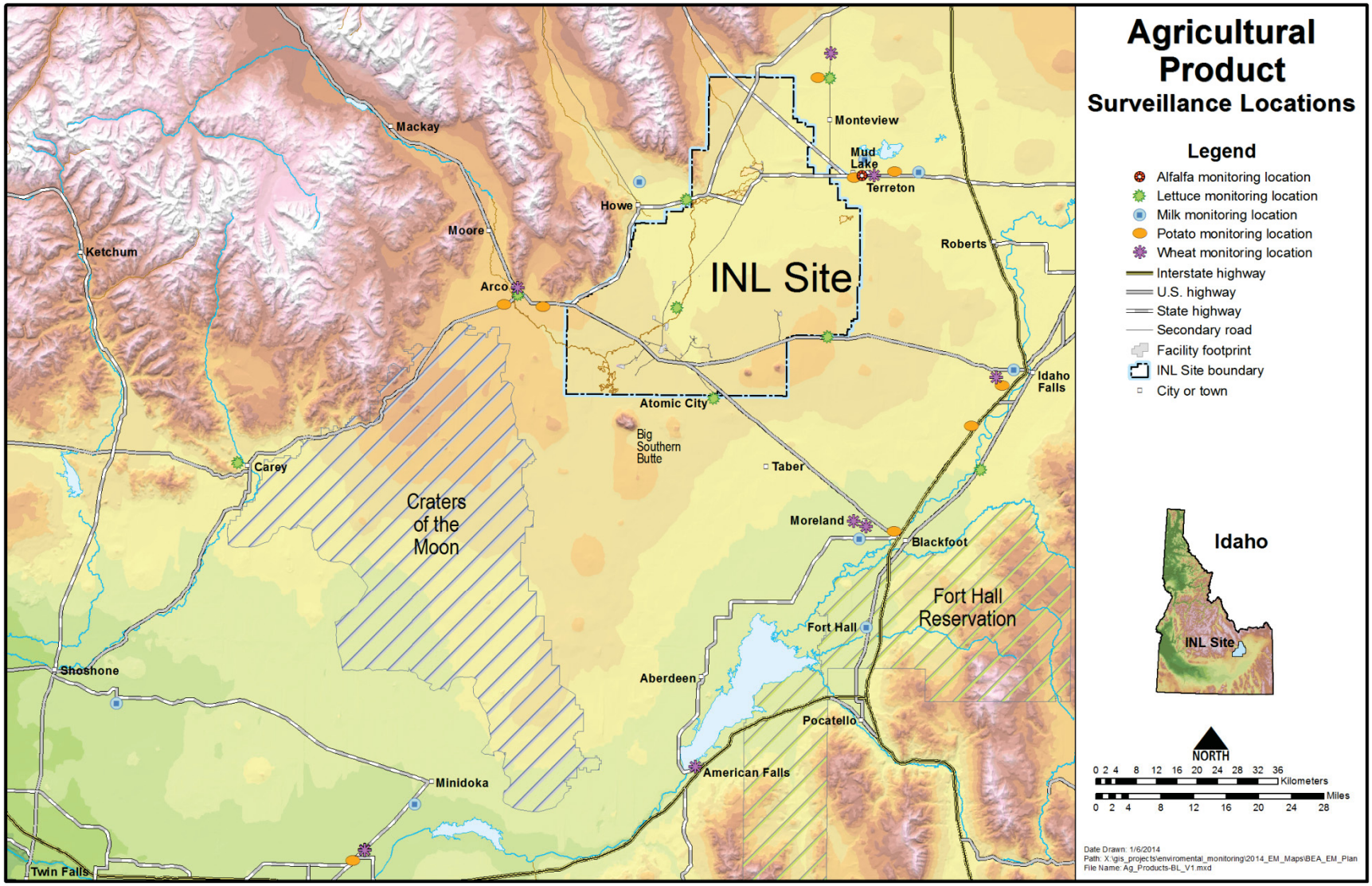

Figure 4-14. Agricultural products monitoring locations.

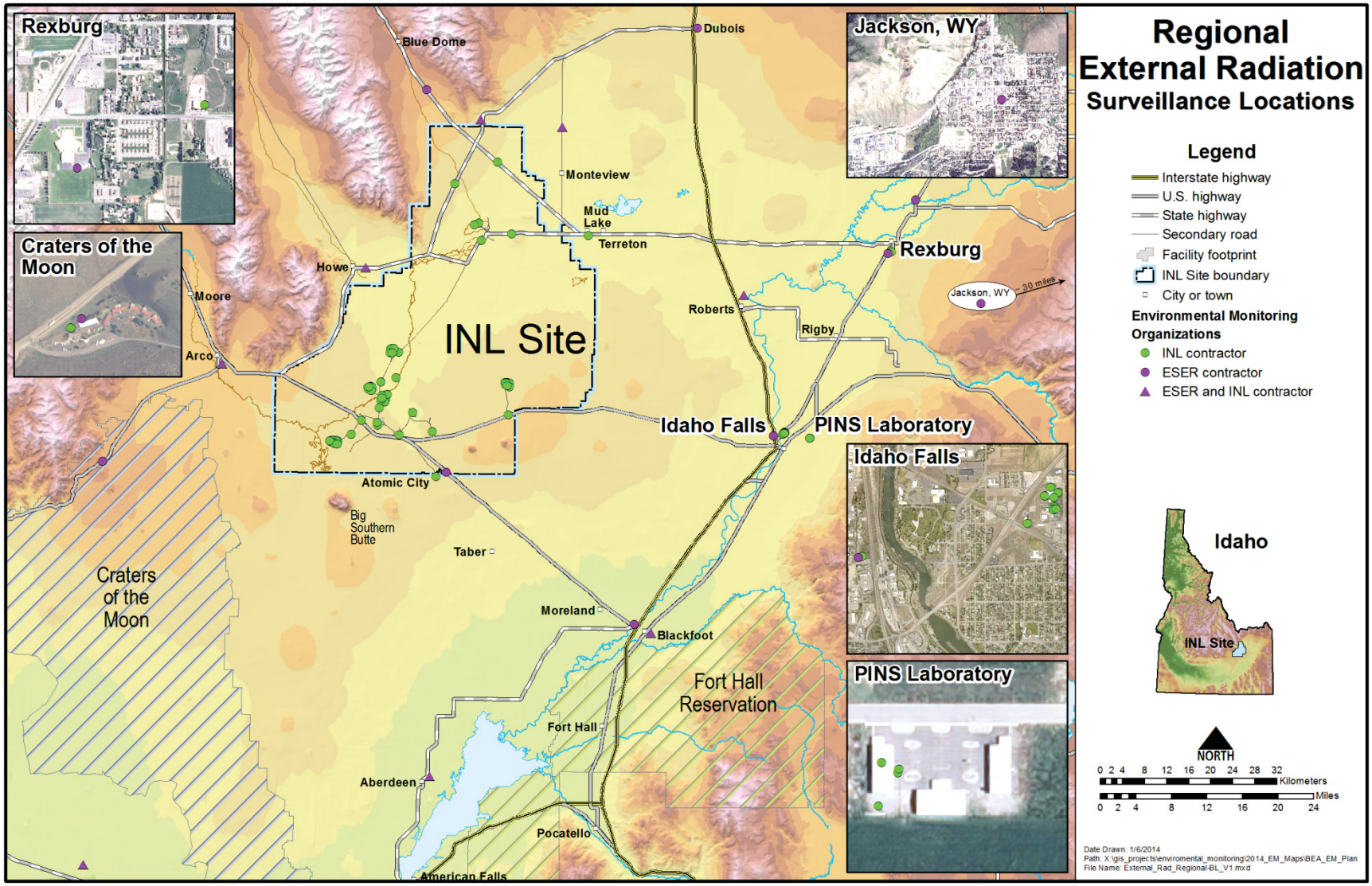

Figure 4-15. Regional external radiation monitoring locations.

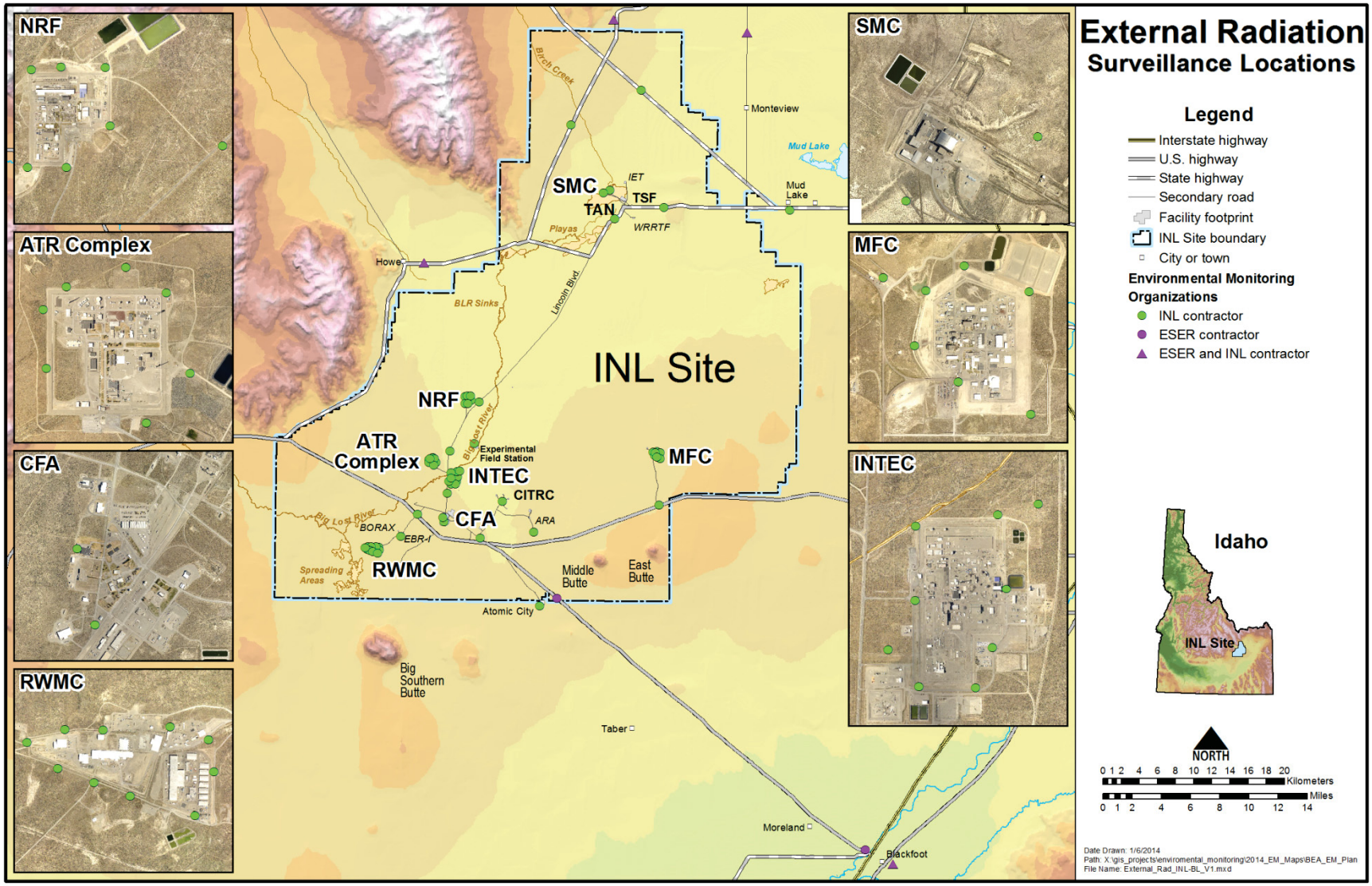

Figure 4-16. Detailed on-Site external radiation monitoring locations.

4.8.1 INL Contractor

External radiation monitoring is performed by the INL contractor as described in the PLN-8510[37] and associated procedures. Environmental dosimeters are maintained at locations on the Site along major highways, around the perimeter fences of each major facility, and at off-Site locations.

A GPRS is used for Sitewide radiological monitoring and Sitewide emergency response. The GPRS units used are primarily for collecting long-term stewardship data and yearly monitoring of gross radiation levels at Site perimeters and roadways. These data are used to identify and analyze year-to-year trends.

4.8.2 ICP Contractor

External radiation monitoring is performed by the ICP contractor as described in ICP PLN-720[28] and associated procedures. Annual surveys are conducted per DOE Order 435.1[3] compliance requirements for detecting gross gamma radiation at the RWMC SDA and around the Idaho CERCLA Disposal Facility. The survey is conducted using a vehicle mounted GPRS. The system utilizes a Trimble Global Positioning System and two plastic scintillation detectors connected to a personal computer on-board the vehicle. The GPRS information data are differentially corrected and transmitted via satellites, and geographic coordinates (latitude and longitude) are recorded at least every two seconds. The vehicle is driven less than or equal to 5 miles per hour, with the detector height at 36-in above the ground.

4.8.3 ESER Contractor

The ESER Program monitors external radiation at seven Site boundary and ten off-Site locations (Figure 4-16) using environmental dosimeters. Two kinds of dosimeter systems are currently used—optically stimulated dosimeters (OSLDs) and thermoluminescent dosimeters (TLDs). OSLD technology is relatively new and involves absorption of ionizing radiation energy by trapping electrons which are excited to a higher energy band. The trapped electrons in the OSLD are released by exposure to a green light from a laser. TLDs have historically been used and involve crystals with impurities which when exposed to ionizing radiation are excited to higher states and remaining there at normal ambient temperature. When TLDs are heated, electrons are released into the in the form of photon energy which is measured with photomultiplier tubes. The crystal then returns to the lower state of energy. The primary advantage of OSLD technology compared with TLD technology is that the nondestructive reading of the OSLD allows for multiple readings of the dosimeter.

An OSLD and TLD is placed at each location one meter above the ground surface. The dosimeters are changed semiannually, normally in early May and again in early November. Conversion to OSLDs began in November 2010 when they were placed side-by-side with existing thermoluminescent dosimeters (TLDs). Both kinds of dosimeters continue to be used in order to provide a comparative data base prior to converting completely to OSLDs.

The Operational Dosimetry Section of the ICP contractor analyzes the TLDs. The four chips are read separately and a mean response is determined for each set. This value is converted to the exposure in milliroentgen based on a detailed calibration procedure. Dosimeter data are interpreted by comparing exposures measured at the boundary locations to those at distant locations.

The OSLDs are analyzed by the Idaho State University Environmental Assessment Laboratory.

4.8.4 NOAA

The NOAA ARLFRD is primarily responsible for meteorological monitoring at the Site (see Section 5). In the past, ARLFRD maintained its own external radiation sensors at the towers in the meteorological monitoring network, but these have been deactivated. All external radiation sensors on the NOAA towers are owned and maintained by other organizations as described in other parts of this section.

ARLFRD collects these data together with the meteorological data so that the information can be simultaneously displayed using ARLFRD's meteorological display tool that is described in a following section. The ARLFRD's primary role with these sensors is to collect and display the data in near-real time.

4.9 Ecological Monitoring

The ESER Program conducts an array of ecological activities on the Site to provide ecological and natural resources support to DOE-ID for land management issues and to supply ecological information and expertise to support activities that affect natural resources. These activities include wildlife and vegetation surveys, revegetation, weed management, assessing potential impacts to ecological resources, and facilitating ecological research on the Idaho National Environmental Research Park.

Specific ecological monitoring work at the Site involves collecting data related to the abundance and distribution of certain species or groups of species. Results provide information on ecological conditions and trends at the Site that are used to:

- Provide assessments of the condition and trend of INL Site ecological resources
- Assess compliance with federal and state regulations
- Provide assessments of the likely impacts to ecological resources from human-caused or natural disturbances
- Propose mitigation for minimizing adverse impacts to ecological resources from Site activities
- Support the long-term stewardship goal of conserving ecological resources
- Provide baseline data to support ecological research opportunities at the Idaho National Environmental Research Park.

Ecological monitoring data are provided in various technical reports and presented on the ESER web site athttp://www.gsseser.com/. The data are reported to DOE-ID and various state and federal natural resource and agricultural agencies with whom the ESER Program collaborates.

4.9.1 Native Vegetation and Invasive Plants

Long-term vegetation plots were established in 1950 to monitor the potential effects of activities at the INL Site on ecological resources. Although they were established for that specific purpose, vegetation plots now provide one of the most significant data sets for understanding vegetation dynamics in sagebrush steppe. These plots are among the most intensive and scientifically rigorous efforts by any agency to document long-term changes in sagebrush steppe. This monitoring provides information on plant community-level changes at a landscape level. Initially, 100 permanent plots were established on two intersecting transects (Figure 4-17). These plots are surveyed at 5-year intervals. Data collected at each plot include cover by line intercept and point interception frame and density and frequency.

Beginning in 2013, additional vegetation data is collected to characterize habitat quality for sage grouse. Two hundred twenty-five plots are monitored on a three-year rotation to provide information on abundance and distribution of native and non-native plants. Additional surveys are conducted annually to inventory areas dominated by non-native annual grasses.

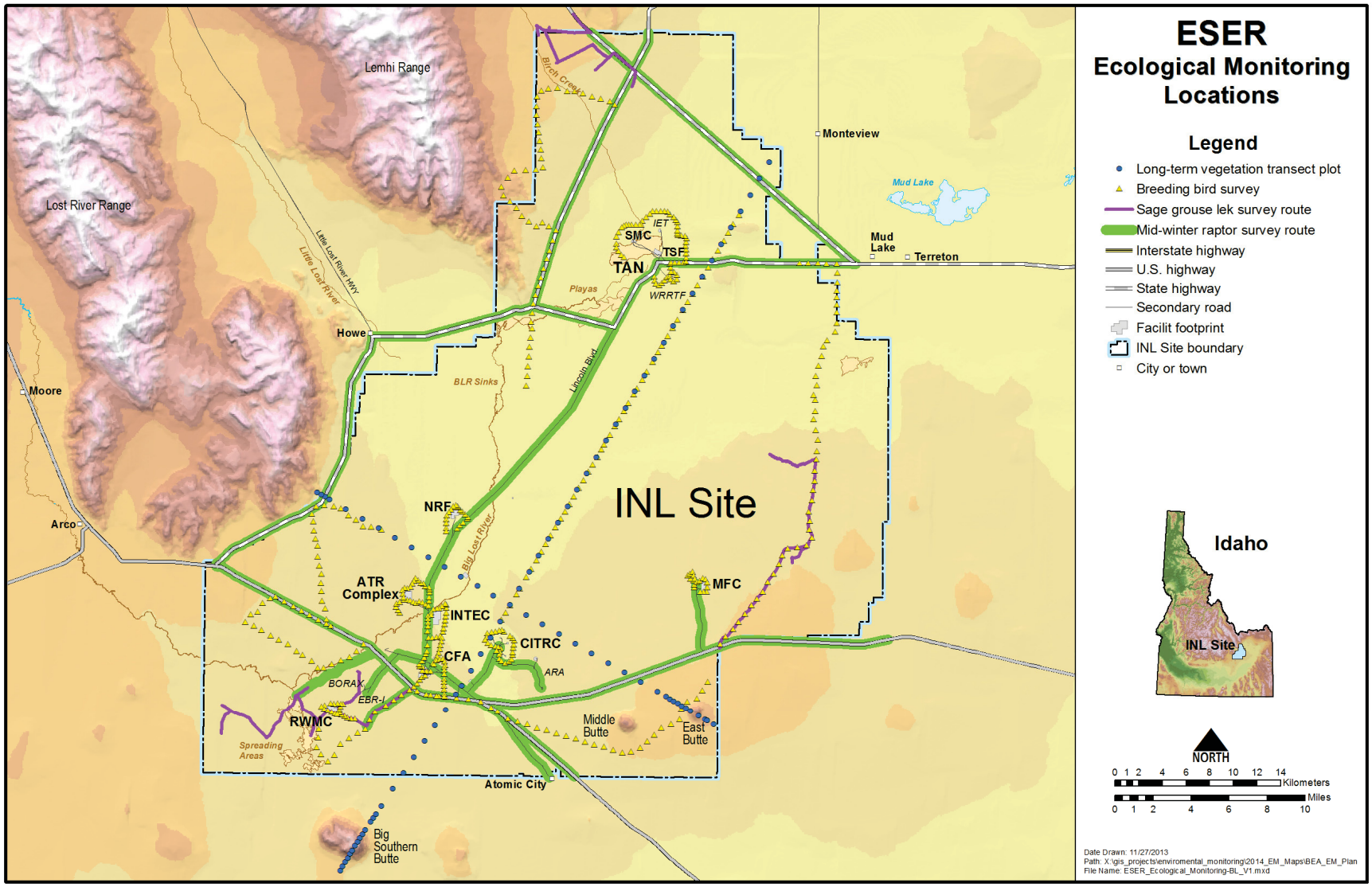

Figure 4-17. ESER Program ecological monitoring locations.

4.9.2 Mammals

Large mammal surveys through 2009 were conducted in January and July each year to estimate abundance and distribution of elk, deer, and pronghorn antelope. The surveys were done from the air on a representative sample of transects. Data were collected in a manner that is comparable with those collected by neighboring agencies (Idaho Department of Fish and Game, Bureau of Land Management, and U.S. Forest Service for example). From 2010 through 2012 the scope of the big game surveys was changed from conducting flights across the INL Site to placing global positioning system collars on elk. This study provided defensible and reliable data for NEPA documents and enable a more complete and reliable assessment of impacts from infrastructure development, roadway accidents, and wild fires. This study provided information on migratory corridors, agricultural area use, contaminant area use, and evaluation of potential radionuclide contamination of human receptors off the INL Site.

Recently, white-nose syndrome (WNS) has been identified as a major threat to many bats that hibernate in caves. WNS is a disease caused by a cold-adapted fungus (*Geomyces destructans*). Since its discovery in 2006, transmission of WNS has expanded 1,200 km (746 miles) from New York to Oklahoma, and researchers estimate that the spread of WNS syndrome will continue. WNS has killed at least 5.5 to 6.7 million bats in seven species. This disease has been labeled by some as the greatest wildlife crisis of the past century, and many species of bats could be at risk of significant declines or extinction due to this disease. Several species of bats on the INL Site could be affected by WNS. One of these species (little brown myotis [*Myotis lucifugus*]) has been petitioned for emergency listing under the Endangered Species Act (ESA). Two species that occur on the INL Site (western small-footed myotis [*Myotis ciliolabrum*] and western long-eared myotis [*Myotis evotis*]) are the western counterparts of the eastern small-footed myotis (*M. leibii*) and northern long-eared myotis (*M. septentrionalis*). The status of the latter two species is currently being reviewed for potential listing under the ESA. Therefore, the ESER Program developed and initiated a bat monitoring program on the INL Site in collaboration with the U. S. Fish and Wildlife Service and Idaho Department of Fish and Game.

4.9.3 Birds

The DOE is preparing a Candidate Conservation Agreement (CCA) for Greater Sage grouse which are under consideration for protection under the Endangered Species Act. Sage grouse populations on the INL Site are monitored annually by surveying their use of leks on three routes. Breeding and nesting generally occurs within two miles of leks. Sage grouse lek routes (Figure 4-17) are monitored weekly for a minimum of 4 weeks beginning in March. The surveys are conducted by visiting those leks at dawn and counting the number of individual birds. The methods used provide comparable data to those collected by neighboring agencies and the data collected are shared with them. As part of the CCA, additional lek surveys are conducted in the spring to identify all active leks on the INL Site.

Beginning in 2012, raven nests have been inventoried and monitored for nest success. Ravens have been reported to be important predators on sage grouse eggs and chicks. Ravens often use infrastructure as nesting sites. These include buildings, power poles, chimneys, stacks and other vertical structures. Monitoring to determine raven nest locations can be used to develop nest deterrents.

Raptors are surveyed annually on the Site through mid-winter raptor counts in collaboration with the United States Geological Survey Biological Resources Division (USGS-BRD). Raptor populations tend to fluctuate with slight changes in the environment, such as prey availability and weather conditions. Therefore, they are often used as environmental indicators to determine effects of human development on the environment and the general health of the ecosystem. Site raptor surveys are conducted in conjunction with the nationwide USGS-BRD Mid-winter Bald Eagle Survey. The ESER Program surveys two official USGS-BRD Mid-winter Bald Eagle Survey routes (Figure 4-16). In addition to surveying for bald eagles, ESER surveys include all eagles, hawks, falcons, shrikes, owls, ravens, crows, and magpies.

The Breeding Bird Survey (BBS) is a large-scale survey of North American birds. It is a roadside route survey of avifauna designed to monitor abundance and distribution of birds primarily covering the continental U.S. and southern Canada. It is administered by the USGS-BRD. These surveys yield useful information about population dynamics, effects of weather and fire on avian abundance, effects of INL Site operations on avifauna, and the breeding status of a number of bird species of concern, including sagebrush obligate species and other species exhibiting declines throughout their range. Thirteen BBS routes are surveyed on the Site (Figure 4-17). Five remote routes are standard 40-km (25 mi) BBS routes, data from which are reported to the USGS-BRD annually. These routes traverse the remote areas of the INL Site and include major habitat types throughout the Site. Eight facility routes are located in and around major Site facility complexes. Each remote route consists of 50 stop locations at approximately 0.5-mi (0.8 km) intervals. Facility routes consist of 18–60 stop locations at approximately 0.2-mi (0.32 km) intervals. The data collected are comparable to those collected by other neighboring agencies.

5. METEOROLOGICAL MONITORING

The meteorological monitoring program supports laboratory-wide environmental monitoring activities as well as emergency response. Short- and long-term weather conditions have a substantial effect on the INL Site environment, particularly with respect to the movement of contaminants in air and the groundwater system. Meteorological monitoring is performed to record weather conditions such as wind speed and direction, temperature, and precipitation so that this information may be used with predictive models to estimate the concentration of contaminants after they have been released to the environment. Meteorological monitoring results are also used to plan environmental measurement programs or for modeling required for compliance with air quality regulations. For example, the Site contractors perform modeling to show compliance with ambient air quality regulations and to comply with requirements to estimate off-Site dose (see Section 9 for a discussion of dose assessment modeling). Figure 5-1 shows the meteorological monitoring locations.

Results of past work related to the tower network are summarized in DOE-ID-12118[6], and DOE-ID-12119[35].

5.1 NOAA

Meteorological services and supporting research are provided to the INL Site by the NOAA ARLFRD. The ARLFRD provides real-time meteorological data, climatological data, weather predictions, and dispersion calculations for routine operations and emergency response.

The ARLFRD operates a meteorological monitoring network that covers an area of approximately 3,885,000 hectare (15,000 mi^2) to characterize the meteorology and climatology of the INL Site. The network consists of 35 meteorological towers both on and around the Site. Most of the towers are 15 m (50 ft) tall and take wind speeds and direction measurements at 15 m (50 ft), temperatures at 2 m and 15 m (6 and 50 ft), and relative humidity at 2 m (6 ft) above ground level. Three taller towers range from 46 m to 76 m (150 ft to 250 ft) high and are instrumented at multiple levels. Many towers have additional sensors for precipitation, solar radiation, and barometric pressure. All the tower measurements are averaged over 5-minute periods and transmitted to ARLFRD in near real-time via radio-frequency communication.

In addition to the meteorological towers, ARLFRD operates a 915-MHz radar wind profiler with a Radio Acoustic Sounding System at a site just north of INTEC. These systems provide wind speed and direction profiles up to about 4 km (2.5 mi) above ground level and temperature profiles up to about 1 km (0.6 mi) above ground level, thereby providing crucial information about winds and temperatures aloft. More recently, ARLFRD added a minisodar system capable of providing high-resolution wind and turbulence measurements up to 200 m (650 ft) above the ground.

The ARLFRD has also developed a program called INLViz to display data in near real-time from the tower network and the vertical profilers. INLViz has been installed at many office locations both within and outside the INL Site. At this time INLViz is being phased out in favor of web-based displays of the network data. A real-time display of the meteorological data is publicly available on the Internet at http://www.noaa.inel.gov/windV/windV.asp. In addition, ARLFRD now maintains an INL Site Weather Center at http://niwc.noaa.inel.gov that provides a range of meteorological information relevant to the INL Site.

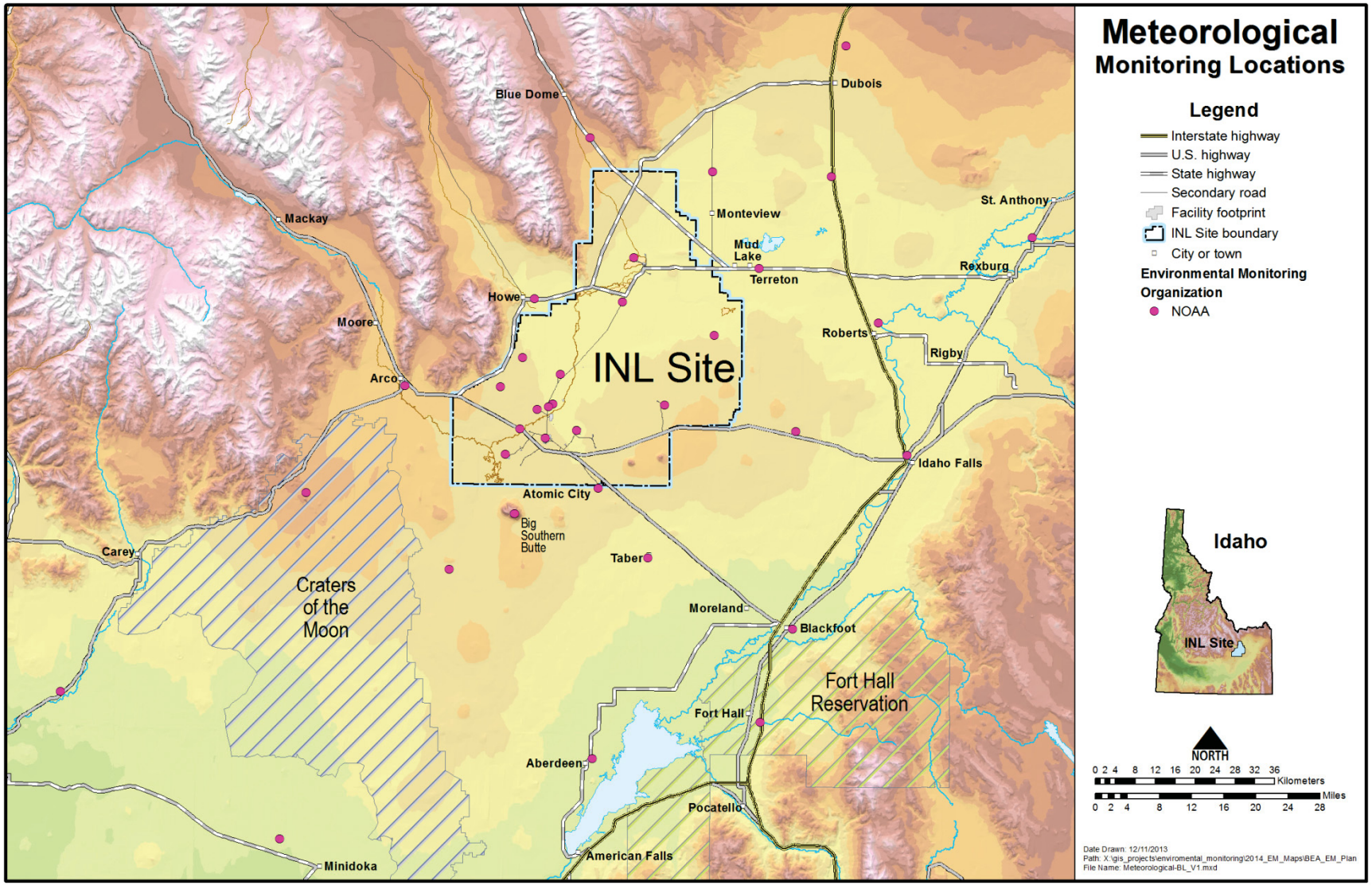

Figure 5-1. Meteorological monitoring locations.

6. ENVIRONMENTAL EVENT MONITORING

Environmental event monitoring is an essential part of safe operations because of the potential impacts a release of radioactive or regulated materials from Site facilities, either from unplanned/accidental operational events or natural events, could have on the environment and the public. Environmental events at the Site can be widespread (e.g., a wildland fire spread by high winds) or facility-specific (e.g., a chemical spill limited to a small area immediately around the spill). Data from event-specific monitoring are used to evaluate the potential impact of an event to personnel, the environment, and the public.

Responses to environmental events vary depending on the severity of the event and are conducted by the responsible contractor. The INL contractor responds to all events. Figure 6-1 shows the locations of samplers specifically intended for use during an environmental event. Locations of portable or routine samplers are not shown.

6.1 Response to an Emergency or Unplanned Release

The INL Site has an extensive program to identify chemical/radioactive hazards, evaluate associated risks, prevent accidental releases, and respond appropriately in the event of a release. This comprehensive INL Site Emergency Preparedness Program is addressed in PLN-114, *INL Emergency Plan/RCRA Contingency Plan*[50]. The Plan is used by the Emergency Response Organization and other trained personnel in the event of an emergency and provides the overall process for responding to and mitigating consequences of emergencies that might arise at the Site. Emergency plans for the INL Site consolidate all emergency-planning requirements for federal, state, and local agencies. Mutual aid agreements are in place between the INL and state and local agencies to respond to emergencies. One such agreement allows local fire departments to respond to fires on the Site and allows the INL fire department to respond to fires off-Site.

In the event of an emergency or unplanned release, anthropogenic or natural radioactivity can be released into the air. These releases could result from direct atmospheric release from a facility, or by redistribution by fire or winds of anthropogenic or natural radioactivity contained in soil and vegetation. During such events the INL contractor collects field data. Data collected include readings of penetrating radiation levels, airborne and surface contamination levels, and radiation surveys outside of facility fences. Three types of air samples can be taken during environmental events that are declared operational emergencies or which involve soil contamination areas:

- Immediate short-term "grab" samples
- Stationary 24-hour samples at strategic locations specific to the event
- Routine environmental samples taken at standard locations (continuous monitoring).

Field data results are reported to the Emergency Response Organization.

The Plan also includes spill prevention and response requirements for each facility. Spills and releases are reported to the Spill Notification Teams. The Spill Notification Teams determine if the spill or release is reportable and provides assistance to operations for making appropriate release notifications.

6.1.1 AMWTP

Spills or releases greater than a reportable quantity or permit limit are reported to the state and federal authorities as required. The AMWTP also has a *Spill Response Procedure* (AMWTP-MP-EC&P-7.10)[51]

and an *Advanced Mixed Waste Treatment Project Emergency Plan/RCRA Contingency Plan* (AMWTP-MP-EP&C-12.1)[52].

AMWTP has installed ANSI N13.1[24] compliant monitors with alarms on two stacks at the AMWTP. If the stack monitors initiate an alarm, AMWTP will respond using a graded approach to minimize the release by switching filter banks and/or shutting down the processes.

6.1.2 ICP

The ICP Spill Notification Team is responsible for release notifications in accordance with federal and state regulations, DOE orders, executive orders, and company requirements. The ICP Spill Notification Team provides 24-coverage. The team documents all spills, determines if releases are reportable, documents required information, determines thresholds, and makes release notifications within prescribed timeframes.

6.1.3 INL

High-volume air samplers owned and maintained by ES&S are located at some of the ARLFRD towers operated by NOAA. These samplers are intended for use in the event of a radiological accident at the Site and are not used for routine environmental monitoring. Samplers can be turned on and off remotely upon request from DOE-ID by an operator stationed at ARLFRD or in the Emergency Operations Center (EOC).

Short-term grab samples are taken in the field by the ES&S Monitoring Services organization to provide gross radiation levels for early indication of event conditions. The grab samples are taken using portable high-volume air monitors to assess exposure potentials, verify the effectiveness of on-Site protective actions, and determine the need for off-Site protective actions. The high-volume air monitor locations are selected by the EOC based on wind direction and conditions specific to the event. High-volume air monitors are capable of drawing large quantities of air through a particulate filter over a short period of time (approximately 15 minutes) and are used to detect gross alpha and gross beta emitting radionuclides. Results of short-term samples are generally available within 1 to 2 hours after samples are collected.

Event-specific monitoring provides data to evaluate potential radiological doses associated with events resulting in accidental or unplanned radiological releases from Site operations or wild fires. During the fire season, the INL contractor temporarily installs high-volume air samplers that can be activated during wildfires in situations where the fire may burn through areas with radiological contamination. Because most events are short term, ambient air is sampled for 24 hours to obtain the required airflow through the samplers and desired detection levels for specific radionuclide measurements. These samplers are not weather-hardened and are used only during the fire season (May through September).

The INL contractor maintains a routine monitoring network of low-volume air samplers at fixed locations that take continuous air samples. Results from these routine environmental samples are used to supplement other event-specific measurements to determine and document the nature and quantity of any radioactive material detected in ambient air on and around the INL Site.

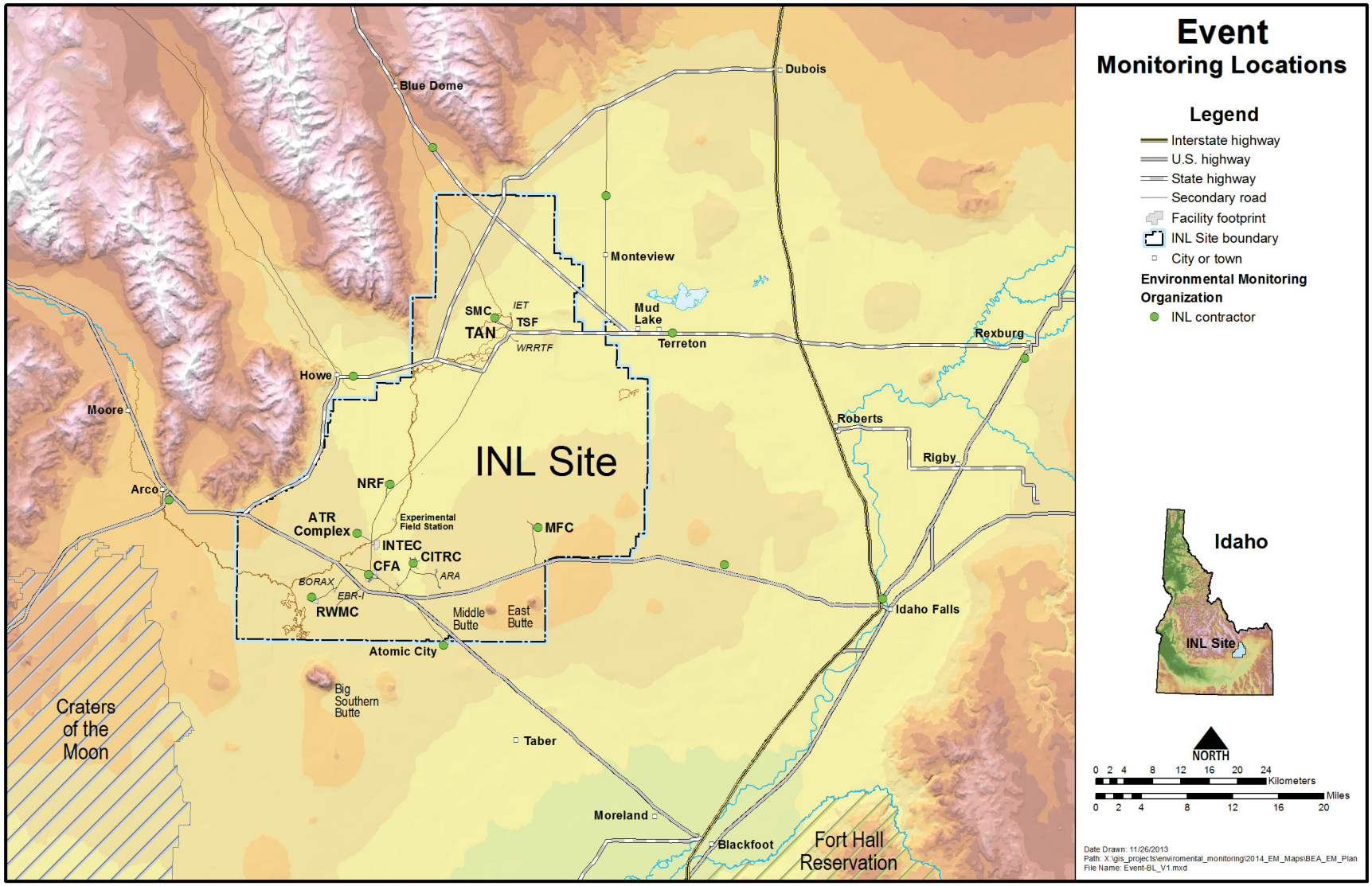

Figure 6-1. Event monitoring locations.

6.2 Response to an Exceedance

Each INL contractor maintains their own plans or procedures to ensure that appropriate, timely notifications to appropriate authorities occur and that corrective actions are taken in the event that monitoring results exceed a regulatory limit or, in some cases, a preset trigger level. Specific actions to be taken when validated monitoring results are above certain trigger levels are identified in the applicable permits and regulations (e.g., RCRA, WRP, and Safe Drinking Water Act[41]). These actions include reporting any exceedances to the appropriate federal, state, or local agencies, along with initiating appropriate corrective actions in a timely manner. The types of corrective actions could vary depending on the specific regulation and could include follow-up analysis or confirmation sampling, removing potable water well from service, or remedial action.

For reportable occurrences, specific actions to be taken are identified in the DOE Order 231.1B, *Environment, Safety and Health Reporting*[53], which establishes reporting requirements and categorizes releases of radionuclide and hazardous substances or regulated pollutants. Taking the following general steps when responding to an environmental data exceedance will ensure that coordinated actions are taken and INL Site stakeholders are notified in a timely manner:

1. Discover, confirm, and make initial notification
2. Categorize environmental data exceedance
3. Determine and initiate appropriate response
4. Complete necessary reporting and notification.

7. REPORTS

General reporting requirements for effluent monitoring and environmental monitoring activities at the INL Site are outlined in DOE Order 231.1B[53] and DOE Order 458.1[1]. These orders specify the reporting responsibilities, timing, and distribution of several routine environmental reports. The requirements for preparing and distributing accident-related or unusual occurrence reports are included in DOE Order 231.1B[53].

Following are the principal objectives of DOE's reporting system, as stated in DOE/EH-0173T[4]:

- Alert DOE management to occurrences for the purpose of investigating and evaluating causes, and identify appropriate measures to prevent recurrences
- Obtain early, complete, and factual information on occurrences as a basis for reports to the Secretary of Energy, Congress, other federal agencies, and the public, as appropriate
- Identify trends in areas of concern for DOE and contractor operations
- Provide a basis for improving codes, guides, and standards used in the DOE and contractor operations
- Monitor, evaluate, and report on-Site discharges, liquid and airborne effluents, and environmental conditions in the vicinity of DOE sites to assess the levels of radioactive pollutants and their impact on the public and the environment
- Comply with regulations and DOE orders.

Compliance monitoring data driven by specific permits or regulatory requirements are reported to federal, state, and local agencies in formats and frequencies specified by the respective regulatory document. Table 7-1 lists effluent and environmental monitoring reports at the INL Site.

Table 7-1. Effluent monitoring and environmental monitoring reports at the INL Site.

Report Title	Frequency	Summary Description
Annual Site Environmental Report	Annual	Summarizes DOE, USGS, and contractor data from environmental monitoring activities and data from monitoring programs. Includes a yearly environmental compliance summary for the INL Site.
INL Offsite Environmental Surveillance Program Reports	Quarterly	Reports results of offsite monitoring under the ESER Program including air, agricultural, external radiation, soil, water, and wildlife sampling.
INL Oversight Program Environmental Surveillance Program Reports	Quarterly	Presents quarterly environmental data results and associated quality assurance data.
	Annual	Summarizes trends in environmental data and compares data collected by the INL Oversight Program, contractors, and the USGS for selected sample locations.
Injection Well Monitoring Reports	As required	Provides the analytical results from monitoring of storm water runoff discharged to injection wells.
Semi-Annual Report for the HWMA/RCRA Post Closure Permit for the Waste Calcining Facility at INTEC	Semiannual	Summarizes the analytical results from HWMA/RCRA groundwater monitoring conducted for the Waste Calcining Facility Post Closure Permit.
Fiscal Year Environmental Monitoring Report for the RWMC	Annual	Summarizes monitoring data from the air, waste zone, vadose zone, and aquifer in and around the RWMC.
USGS Scientific Investigations Reports	Every 3 years	Summarizes USGS data, describes hydrologic conditions and distribution of selected constituents in groundwater and surface water in and around the INL Site.
Wastewater Reuse Site Performance Reports for the INL Site	Annual	Reports required information for each permitted Wastewater Reuse facility to include (a) all permit monitoring data (b) status of any permit special compliance conditions, (c) interpretive discussions of monitoring data with particular respect to environmental impacts by the facility.
Monthly and Semiannual Liquid Effluent Reports to city of Idaho Falls	Monthly and Semiannual	Monthly pH logs and semiannual monitoring reports from the IRC effluent to the city of Idaho Falls sewer system.
Storm Water Discharge Monitoring Reports	As required	Reports storm characteristic information and all analytical results from National Pollutant Discharge Elimination System permit monitoring.
CERCLA 5-Year Review Reports	Every 5 years	Reports overall effectiveness of remedial actions covered by a CERCLA ROD.
CERCLA Post-Record of Decision Monitoring Reports	As specified in ROD	Summarizes data collected in support of remedial actions and long-term monitoring.

7.1 ICP and INL Reporting Requirements

The INL and ICP contractors are responsible for reporting requirements for their respective facilities with regard to:

- Source-specific and Sitewide air permits required for compliance with Public Law 91-604, *Clean Air Act Amendments of 1990*[17] and with IDAPA 58.01.01, *Rules for the Control of Air Pollution in Idaho*[18]
- Permits required for compliance with IDAPA 58.01.17, *Recycled Water Rules*[20]
- Permits required for compliance with IDAPA 37.03.03, *Rules for the Construction and Use of Injection Wells in the State of Idaho*[34]
- Laboratory-wide permits and records required under the RCRA; Public Law 94-469, *Toxic Substances Control Act*[54]; 42 USC 11001, *Emergency Planning and Community Right-to-Know Act*[55], and 7 USC 136, *Federal Insecticide, Fungicide, and Rodenticide Act*[56]
- 42 USC 9601, *Comprehensive Environmental Response, Compensation, and Liability Act*[15]
- Public Law 104-182, *Safe Drinking Water Act*[41].

The INL contractor is also responsible for reporting requirements associated with the following:

- City Order Chapter 1, Section 8, *Permits required for compliance with City of Idaho Falls Sewer Ordinance and Municipal Stormwater Discharge Permit*[32].

7.2 ESER Program Reporting

The ESER Program prepares the ASER each calendar year, with input from the various organizations performing environmental monitoring on and around the INL Site. The ASER is available electronically, summarizes data from effluent monitoring programs, environmental monitoring activities, and includes a yearly environmental compliance summary for the INL Site. The ASER is prepared as required by DOE Order 231.1B[53].

The ESER Program prepares quarterly reports summarizing off-Site monitoring results and distributes these electronically. A number of other topical reports summarizing trends in data for a particular medium or dealing with other environmental monitoring subjects are produced periodically.

The ESER Program also maintains an environmental public communications and education program. Articles covering environmental monitoring and other ESER Program activities are published in the ESER Program newsletter and in press releases. The ESER Program has established a web site at http://www.gsseser.com/ containing information on the various aspects of the program, all ESER Program data, and recently published reports.

7.3 USGS Reporting

All data collected by the USGS INL Project Office are publicly available after review. Most data are published in periodic data reports and used in interpretive reports. The ASER contains an appendix listing the abstracts of USGS publications for the calendar year. The USGS National Water Information System web site is open to the public. This system permits public electronic access and retrieval of USGS water data, including groundwater and water quality data. The web site address is http://waterdata.usgs.gov/id/nwis/.

7.4 NOAA Reporting

The NOAA-ARLFRD, *Quality Program Plan, NOAA Air Resources Laboratory Field Research Division*[57], addresses the requirements of DOE Order 414D, *Quality Assurance*[8], and is consistent with

ANSI/ANS-3.11-2005*, Determining Meteorological Information at Nuclear Facilities*[58]. Implementing procedures include regular independent system and performance audits, written procedures and checklists, follow-up actions, and continuous automated and visual data checks to ensure representation and accuracy. The plan and implementing procedures provide the framework to ensure that the INL Meteorological Monitoring Network meets the elements of DOE/EH-0173T[4] and DOE Order 458.1[1].

Network meteorological data are transmitted every five minutes from each station in NOAA's meteorological network via radio to the central ARLFRD facility in Idaho Falls. The data receive nearly continuous monitoring and quality control screening. Data are recorded on electronic media and stored in a dedicated, computerized archive, with backup media maintained as recommended by DOE/EH-0173T[4].

Specific climatological data from the IEMP are available in real time to the public electronically at http://www.noaa.inel.gov/. The ARLFRD's data specific to the INL Site are available in near real time electronically at http://niwc.noaa.inel.gov/. Results of past work are summarized in DOE/ID-12118[6] and DOE/ID-12119[35].

8. QUALITY ASSURANCE

An effective quality assurance (QA) program is essential to collect quality data. This section presents QA procedures and practices used as part of the effluent monitoring and environmental monitoring programs. This section does not provide a QA plan for monitoring at the INL Site but rather defines QA requirements applicable to environmental programs. Each monitoring organization incorporates the required components into its QA documentation for environmental monitoring.

The primary policy, requirements, and responsibilities for establishing and maintaining plans and actions that ensure QA in DOE activities are provided in DOE Order 414D[8], *Quality Assurance*, 10 CFR 830, Subpart A, *Quality Assurance Requirements*[59], and American Society of Mechanical Engineers (ASME) NQA-1-2004, *Quality Assurance Requirement for Nuclear Facility Applications*[60]. The ASME NQA-1-2004 is the preferred standard for activities at nuclear facilities. Additional QA program requirements found in 40 CFR 61, Appendix B[23] must be met for all radiological air emission sources continuously monitored for compliance with 40 CFR 61, Subpart H[5].

The EPA policy on QA plans is based on the national consensus standard ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*[61]. The EPA approach to data quality centers on the data quality objective process. Data quality objectives are project dependent and are determined on the basis of the data users' needs and the purpose for which data are generated. Quality elements applicable to environmental monitoring and decision-making are specifically addressed in EPA/240/B-01/003, *EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5)*[62]. These elements are included in the following general categories:

- Project management
- Data generation and acquisition
- Assessment and oversight
- Data validation and usability.

8.1 QA Requirements

The QA procedures are designed to ensure sample integrity, precision, and accuracy in the analytical results and to ensure that the environmental data is representative and complete. The following subsections describe how each monitoring organization implements the above QA requirements.

8.1.1 INL Contractor

The INL contractor integrates applicable requirements from *Manual 13A—Quality and Requirements Management Program Documents*[63], into the implementing monitoring program plans and procedures for non-CERCLA monitoring activities. The program plans address the QA elements as stated in EPA/240/B-01/003[61] to ensure that the required standards of data quality are met.

In addition, the INL contractor uses a documented approach for collecting, assessing, and reporting environmental data. Environmental and effluent monitoring are conducted in accordance with PLN-8510 *Planning and Management of Environmental Support and Services Monitoring Services Activities*[36], PLN-8515 *Data Management Plan for the INL Environmental Support and Services Monitoring Services Program*[64], and PLN-8550 *Environmental Support and Services Monitoring Services Surveillance Plan*[38] in order to assure that analytical work for environmental and effluent monitoring supports data quality objectives.

8.1.2 ICP Contractor

All CERCLA monitoring activities at the INL Site are conducted in accordance with DOE/ID-10587, *Quality Assurance Project Plan (QAPjP) for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Removal Actions*[65]. The Quality Assurance Project Plan was written in accordance with EPA/540/G-89/004, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Office of Emergency and Remedial Response*[66]. In addition, the ICP contractor uses:

- PLN-720, "Environmental Surveillance Program Plan"[28]
- PLN-729, "Idaho Cleanup Project Liquid Effluent Monitoring Program Plan"[33]
- PLN-730, "Idaho Cleanup Project Drinking Water Program Plan"[43]
- PLN-1305, "Groundwater Monitoring Program Plan"[67]
- PLN-1373, "Groundwater Monitoring Plan for the Waste Calcining Facility and for the CPP-601/627/640 Facility"[68].

8.1.3 AMWTP

AMWTP maintains a QA program in accordance with 40 CFR 61, Appendix B[23], as required of all radiological air emission sources continuously monitored for compliance with 40 CFR 61, Subpart H[5]. The QA requirements are documented in AMWTP-PD-EC&P-02, *Quality Assurance Project Plan for the WMF 676 NESHAPs Stack Monitoring System*[69].

8.1.4 ESER Program

The ESER Program maintains a QA program consistent with the requirements of 10 CFR 830[60] and DOE Order 414D[8] that is implemented through the ESER *Quality Assurance Implementation Plan (OIP)*[70]. Additional QA requirements for monitoring activities are provided in the ESER *Offsite Environmental Surveillance Program Quality Assurance Project Plan*[71]. Analytical laboratories used by the ESER Program maintain their own QA programs consistent with DOE requirements.

8.1.5 NOAA

A QA plan[55] addresses the requirements of DOE Order 414D[8], and is consistent with ASME. Implementing procedures include regular independent system and performance audits, written procedures and checklists, follow-up actions, and continuous automated and visual data checks to ensure representativeness and accuracy. The plan and implementing procedures provide the framework to ensure that the INL Meteorological Monitoring Network meets the elements of DOE/EH-0173T[4]and DOE Order 458.1[1].

All the meteorological sensors in the ARLFRD tower network are inspected, serviced, and calibrated semiannually as recommended by American Nuclear Society guidelines found in ANSI/ANS-3.11-2005[58]. Unscheduled service is also promptly performed whenever a sensor malfunctions.

8.2 Sample and Analysis Management Activities

Sample and analysis management activities are performed separately by the various monitoring organizations. Functions performed by each of these monitoring organizations include:

- Developing a Sample and Analysis Plan or equivalent
- Coordinating sampling
- Obtaining analytical laboratory services
- Processing analytical laboratory data packages

- Managing sample and analytical data
- Validating analytical data (where applicable)
- Coordinating sample disposition.

Subcontract laboratories used by the INL and ICP contractors are audited by the DOE Consolidated Audit Program. This program uses trained and certified personnel to perform in-depth audits of subcontract laboratories to review:

- Personnel training and qualification
- Detailed analytical procedures
- Calibration of instrumentation
- Participation in an inter-comparison program
- Use of blind controls
- Analysis of calibration standards.

Audit results are maintained by the DOE Consolidated Audit Program. Laboratories are required to provide corrective action plans for audit findings.

9. RADIOLOGICAL DOSE EVALUATION

Potential radiological doses to the public from INL Site operations are evaluated to determine compliance with pertinent regulations and limits. Two different computer codes are used to estimate doses. The EDE for a maximally exposed individual (MEI) to INL Site airborne releases of radionuclides is calculated annually using the methods prescribed by Subpart H of 40 CFR 61[5] and documented in an annual NESHAP report for radionuclides[25]. The annual dose to the public for the MEI and the collective 80-km (50-mi) population and the biota dose are estimated annually and documented in DOE/ID-12082, *Idaho National Laboratory Site Environmental Report*[75].

9.1 Maximum Individual Dose—Airborne Emissions Pathway

The EDE to an individual member of the public is calculated from airborne emission sources across the INL Site to demonstrate compliance with Subpart H of 40 CFR 61[5] and DOE Order 458.1[1]. Subpart H requires that emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive an EDE of 10 millirem per year. The purpose of DOE Order 458.1[1] is to implement sound stewardship practices that protect the air, water, land, and other natural and cultural resources impacted by DOE operations, and by which DOE cost effectively meets or exceeds compliance with applicable environmental, public health, and resource protection laws, regulations, and DOE requirements. DOE Order 458.1[1] states it is also a DOE objective that potential exposures to members of the public be as far below the limits as is reasonable achievable.

Because individual radiological impacts to the public surrounding the INL Site remain too small to be measured by available monitoring techniques, the dose to the public from INL Site operations is calculated using the reported amounts of radionuclides released from INL Site facilities and EPA-approved air dispersion codes. Compliance to Subpart H of 40 CFR 61[5] is demonstrated primarily through the use of the CAP-88 computer code.

9.1.1 Dose Evaluation Using CAP-88 Computer Code

Use of the CAP-88 computer code is required by the EPA to demonstrate compliance with the *Clean Air Act Amendments of 1990*[17]. Using the CAP-88 code and information on the reported amounts of radionuclides released from INL Site facilities, the EDE to the MEI is estimated. CAP-88 uses dose and risk tables developed by the EPA. It does not include shielding by housing materials, but does include a factor to allow for shielding by surface soil contours from radioactivity on the ground surface. The ARLFRD performs annual meteorological and dispersion assessments as part of the environmental compliance at the Site. Yearly wind statistics are generated for many of the towers in the meteorological network; these are used to run the CAP-88 plume dispersion code required for NESHAP[5] compliance. CAP-88 makes its calculations based on the joint frequency of wind conditions from a single wind station located near a facility (or emission source) in a straight line from that source and ignores recirculation.

9.1.2 Dose Evaluation Using MDIFF Dispersion Model

The ARLFRD developed and maintains a puff transportation and dispersion model called MDIFF to estimate radiological pollutant emissions from the INL Site. The mesoscale diffusion (MDIFF) calculations of total integrated concentrations are used to evaluate the dose to members of the public to show compliance with DOE Order 458.1[1] (NOAA-TM-OAR-ARL-238, PB-2001-014789)[72].

This method offers a more realistic dose estimate for the Site than that from the CAP-88 code. The dispersion algorithms within the code, which are derived in part from field data collected at the Site and the puff transport, are driven by the wind data from the ARLFRD tower network. The MDIFF is used only for calculating population dose. Unlike CAP-88, MDIFF can account for spatial and temporal wind variations associated with the complex topography near the Site.

The ARLFRD has also developed a program called INLViz to display data in near real time from the tower network and the vertical profilers. The program contains a user interface to the MDIFF puff dispersion code. INLViz has been installed at about 50 locations in and around the Site. It is widely used to support Site operations, and is a major part of ARLFRD's support to the INL Site Emergency Operations Center.

9.2 80-Kilometer (50-Mile) Population Dose

An estimate of the collective EDE, or population dose, from inhalation, submersion, ingestion, and deposition resulting from airborne releases of radionuclides from the INL Site is determined from the MDIFF evaluations and information on the population within 80 km (50 mi) of an INL Site facility. Results of the MDIFF population dose evaluations are used to show compliance with DOE Order 458.1[1]. The population dose is calculated from the average dispersion coefficient for the county census division, the population in each census division within that county, and the normalized dose received at the location of the MEI from the MDIFF evaluation. This gives an approximation of the dose received by the entire population in a given county division. Total population dose is the sum of the population dose for the various county divisions. The calculation overestimates dose because radioactive decay and deposition of the isotopes is not calculated during transport over distances greater than that to the MEI. Population estimates are reviewed and updated annually, as necessary.

9.3 Biotic Dose

Maximum radionuclide concentrations in waterfowl and game animals collected from the INL Site are used to estimate a potential dose from ingestion. Estimates of the potential dose an individual may receive from occasionally ingesting meat from game animals take into account that waterfowl may reside briefly at the various waste disposal ponds on the Site and those game birds and other game animals may reside on or migrate across the Site. The potential dose estimate is based on the highest concentrations of radionuclides in waterfowl or game animals sampled from the Site.

A graded approach is used to evaluate the potential dose to aquatic and terrestrial biota from contaminated soil and water according to DOE-STD-1153-2002, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota*[73]. The graded approach evaluates the impacts of a given set of radionuclides on aquatic and terrestrial ecosystems by comparing available concentration data in soils and water with biota concentration guides. Details and justifications for applying the graded approach at the INL Site can be found in NW-ID-2003-062, *Biota Dose Assessment Guidance for the INEEL*[74].

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Appendix A Monitoring Locations

The tables in this appendix contain individual sampling locations for media discussed in this environmental monitoring plan and that are included in the maps and figures in the plan. The following definitions apply to the headings found in the following tables:

- **EMP_REF_ID;** A unique integer assigned to each sample point. This ID number is specific to each sample location identified on the maps in the Environmental Monitoring Plan.

- **LOC_NAME;** The common name assigned to a sample (e.g. 400.3, SDA 2.3). The LOC_NAME is NOT unique and more than one sample location may have the same name.

- **LOCATION DESCRIPTION;** A description of geographical location assigned to the GRL_ID (i.e. 252; Rexburg - Behind Madison Middle School).

Table A-1. Airborne Effluent Monitoring Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
32	EBR-II/FCF Main Stack (ANL-764)	BEA	MFC - Inside facility fence
33	HFEF Stack (ANL-785)	BEA	MFC - Inside facility fence
36	INTEC Main Stack (CPP-708)	CWI	INTEC - Inside facility fence
37	INTEC New Waste Calciner (CPP-659)	CWI	INTEC - Inside facility fence
38	Advanced Retrieval Project	CWI	RWMC/SDA - Inside facility fence
34	Glovebox Extract (WMF-676-003)	ITG	RWMC - TSA/AMWTP area
35	Zone 3 Extract (WMF-676-002)	ITG	RWMC - TSA/AMWTP area

Table A-2. Soil Gas and Soil Moisture Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
538	LF3-East	BEA	CFA Landfill
539	LF3-West	BEA	CFA Landfill
540	LF2-North	BEA	CFA Landfill
541	LF2-South	BEA	CFA Landfill
542	CFA-GAS-V-004	BEA	CFA Landfill
543	CFA-GAS-V-005	BEA	CFA Landfill
544	CFA-GAS-V-006	BEA	CFA Landfill
545	CFA-GAS-V-007	BEA	CFA Landfill
546	CFA-GAS-V-008	BEA	CFA Landfill
563	LF2-03	BEA	CFA Landfill
564	LF2-04	BEA	CFA Landfill
565	LF2-07	BEA	CFA Landfill
566	LF3-03	BEA	CFA Landfill
567	LF3-05	BEA	CFA Landfill
547	TEM2-A	CWI	RWMC facility area
548	TEM3-A	CWI	RWMC facility area
549	9302	CWI	RWMC facility area
550	D-02	CWI	RWMC facility area
551	89-02D	CWI	RWMC facility area
552	9301	CWI	RWMC facility area
553	WWW1	CWI	RWMC facility area
554	USGS-118	CWI	RWMC facility area
555	78-4	CWI	RWMC facility area
556	77-1	CWI	RWMC facility area
557	M10S	CWI	RWMC facility area
558	M1SA	CWI	RWMC facility area
559	88-01D	CWI	RWMC facility area
560	M3S	CWI	RWMC facility area
561	M6S	CWI	RWMC facility area
562	M7S	CWI	RWMC facility area
568	VVE-7	CWI	RWMC facility area
569	SOUTH-MON-A-010	CWI	RWMC facility area

Table A-2. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
570	SOUTH-MON-A-009	CWI	RWMC facility area
571	VVE-6	CWI	RWMC facility area
572	SOUTH-1898	CWI	RWMC facility area
573	VVE-4	CWI	RWMC facility area
574	SOUTH-1835	CWI	RWMC facility area
575	VVE-10	CWI	RWMC facility area
576	RWMC-GAS-V-081	CWI	RWMC facility area
577	RWMC-VVE-V-204	CWI	RWMC facility area
578	RWMC-VVE-V-205	CWI	RWMC facility area
579	RWMC-1816	CWI	RWMC facility area
580	RWMC-GAS-V-074	CWI	RWMC facility area
581	RWMC-1819	CWI	RWMC facility area
582	RWMC-GAS-V-075	CWI	RWMC facility area
583	RWMC-VVE-V-071	CWI	RWMC facility area
584	RWMC-GAS-V-076	CWI	RWMC facility area
585	RWMC-GAS-V-077	CWI	RWMC facility area
586	RWMC-GAS-V-078	CWI	RWMC facility area
587	RWMC-VVE-V-067	CWI	RWMC facility area
588	RWMC-GAS-V-079	CWI	RWMC facility area
589	RWMC-1810	CWI	RWMC facility area
590	RWMC-GAS-V-080	CWI	RWMC facility area
591	RWMC-MON-A-162	CWI	RWMC facility area
592	VVE-1	CWI	RWMC facility area
593	RWMC-VVE-V-163	CWI	RWMC facility area
594	VVE-3	CWI	RWMC facility area
595	RWMC-1809	CWI	RWMC facility area
596	RWMC-1812	CWI	RWMC facility area
597	RWMC-1815	CWI	RWMC facility area
598	RWMC-1818	CWI	RWMC facility area
599	RWMC-1821	CWI	RWMC facility area
600	RWMC-GAS-V-072	CWI	RWMC facility area
601	RWMC-1822	CWI	RWMC facility area

Table A-2. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
602	RWMC-VVE-V-068	CWI	RWMC facility area
603	RWMC-GAS-V-073	CWI	RWMC facility area
604	RWMC-1813	CWI	RWMC facility area
605	RWMC-VVE-V-069	CWI	RWMC facility area
606	RWMC-1817	CWI	RWMC facility area
607	RWMC-1820	CWI	RWMC facility area
608	RWMC-1808	CWI	RWMC facility area
609	RWMC-1814	CWI	RWMC facility area

Table A-3. Atmospheric Moisture Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
667	Tritium Air Monitor - IF	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, southeast corner of Building IF-627
677	Tritium Air Monitor - EFS	BEA	Experimental Field Station - West of facility fence
678	Tritium Air Monitor - Craters	BEA	Craters of the Moon
679	Tritium Air Monitor - VAN B	BEA	Van Buren Blvd just north of U.S. Highway 20/26
95	Blackfoot	GSS	Blackfoot
260	Idaho Falls	GSS	Idaho Falls - North of TSA/TSB on east side of Foot Rd.
261	Atomic City	GSS	Atomic City at NOAA tower
663	Sugar City	GSS	Sugar City

Table A-4. Liquid Effluent Monitoring Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
214	MFC Industrial Waste Pond	BEA	MFC - Industrial Waste Pond
215	CFA Sewage Treatment Facility	BEA	CFA - Southeast sewage treatment lagoon
217	IRC	BEA	Idaho Falls IRC Facility - Point located in the center of the N. Boulevard at main IRC entrance
220	TRA Cold Waste Pond	BEA	ATR Complex - Building TRA-764
221	B21-608	BEA	CFA Rifle Range Building B21-608
223	MFC Ditch C	BEA	West of MFC-TR-62 inside the facility fence
224	MFC Industrial Waste Ditch/Pipeline	BEA	West of MFC-793C inside the facility fence
216	CPP-797	CWI	INTEC - Building CPP-797 inside facility fence
218	CPP-769	CWI	INTEC - Sewage treatment lagoon Building CPP-769
219	CPP-773	CWI	INTEC - Sewage treatment lagoon Building CPP-773

Table A-5. Stormwater Effluent Monitoring Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
610	CFA-MP-3	BEA	CFA - East of CFA-609
611	TAN DISP 01	BEA	TAN/TSF - South facility fence
612	TAN DISP 02	BEA	TAN/TSF - Inside facility fence
613	TAN DISP 03	BEA	TAN/SMC - Inside facility fence east of SMC
614	SPERT DISP 1	BEA	CITRC - South of PBF Support Area
615	SPERT DISP 2	BEA	CITRC - South of facility near the intersection of Jefferson Blvd. and Wilson Blvd.
616	SPERT DISP 3	BEA	CITRC - South of facility and west of Jefferson Blvd.

Table A-6. Ambient Air Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
57	SMC	BEA	TAN/SMC - North of SMC facility fence at NOAA tower
58	Gate4	BEA	Sand Dunes NOAA tower - South of Lincoln Blvd. guard gate #4
59	ANL-W	BEA	MFC - West side of MFC facility fence
61	PBF	BEA	CITRC at PBF Support Area
63	RTC	BEA	ATR Complex - NE corner of facility fence
64	TRA	BEA	ATR Complex - Parking lot along facility fence
65	intec	BEA	INTEC - North of facility
66	CPP	BEA	INTEC - Along the west side of the facility fence south of Cleveland Blvd.
68	Rest Area	BEA	Big Lost River Rest Area on U.S. Highway 20/26
69	CFA	BEA	CFA - North of Building CF-690
634	IF	BEA	Idaho Falls - North of TSA/TSB on east side of Foote Dr.
639	Craters	BEA	Craters of the Moon
641	Blackfoot	BEA	Blackfoot - Mountain View Middle School
643	Van Buren	BEA	Van Buren Blvd just north of U.S. Highway 20/26
644	EFS	BEA	Experimental Field Station - West of facility fence
645	EBR-I	BEA	EBR-I - Inside facility fence south of EBR-602
646	RWMC	BEA	RWMC - Northeast of Pit 9 just outside of facility fence
655	NRF	BEA	NRF - NW of new communication tower south of the main parking lot
656	ARA	BEA	North of ARA I & II facility area on perimeter road
666	2 INCH AIR - IRC	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, east of Building IF-605
67	INT 100.3	CWI	INTEC/ICDF - Just east of TR-55
70	EBF 1.3	CWI	EBR-I - Inside facility fence south of EBR-602

Table A-6. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
71	SDA 2.3	CWI	RWMC - Northeast of Pit 9 just outside of facility fence
72	SDA 1.3	CWI	RWMC - East side of the SDA
73	SDA 11.3	CWI	RWMC - Southeast side of the SDA
74	SDA 9.3	CWI	RWMC - Southwest side of the SDA
75	SDA 6.3	CWI	RWMC - Northwest side of the SDA
76	SDA 4.2	CWI	RWMC - Northeast side of the SDA
77	SDA 4.3	CWI	RWMC - Northeast side of the SDA
78	EBP 1.3	CWI	Van Buren Blvd. 0.7 miles north of EBR-I near cell phone tower
79	EBP 1.2	CWI	Van Buren Blvd. 0.7 miles north of EBR-I near cell phone tower
635	Howe 400.4	CWI	Howe
636	ARPBKG.1	CWI	Howe
39	Idaho Falls	GSS	Idaho Falls - North of TSA/TSB on east side of Foote Dr.
40	DuBois	GSS	DuBois
42	Mud Lake	GSS	Mud Lake - South of State HWY 33 on N 1100 East
44	FAA Tower	GSS	FAA Tower - U.S. HWY 20 west of mile marker 282
45	Main Gate	GSS	Main Guard Gate
46	Van Buren	GSS	Van Buren Blvd just north of U.S. Highway 20/26
47	Craters of the Moon	GSS	Craters of the Moon
48	Mountain View Middle School	GSS	Blackfoot - Mountain View Middle School
49	Jackson Hole	GSS	Jackson Hole
50	Monteview	GSS	Monteview - Near intersection of E 2700 North & N 800 East
51	Blue Dome	GSS	Blue Dome
52	EFS	GSS	Experimental Field Station - West of facility fence
53	Arco	GSS	Arco - NOAA tower 0.5 miles south of U.S. HWY 20/26 mile marker 249

Table A-6. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
54	Atomic City	GSS	Atomic City at NOAA tower
658	Howe	GSS	Howe
661	Sugar City	GSS	Sugar City
698	2 INCH AIR - SUGAR	GSS	Sugar City

Table A-7. Drinking Water Monitoring Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
96	TAN/TSF-613 (WELL #2)	BEA	TAN/TSF - Inside facility fence
97	TAN/TSF-610 MANIFOLD	BEA	TAN/TSF - Inside facility fence
98	TAN/CTF-614 MANIFOLD	BEA	TAN/SMC - Inside facility fence east of SMC
99	TAN/CTF-632 (WELL #1)	BEA	TAN/SMC - Inside facility fence east of SMC
100	TAN/CTF-639 (WELL #2)	BEA	TAN/SMC - Inside facility fence east of SMC
101	MFC-754 Manifold	BEA	MFC - Inside facility fence west of MFC-707
102	TRA-650 (WELL #3)	BEA	ATR Complex - Outside facility fence near northeast corner
103	TRA-608 MANIFOLD	BEA	ATR Complex - Inside facility fence near northeast corner
104	TRA-672 (WELL #4)	BEA	ATR Complex - Inside facility fence near northeast corner
105	TRA-601 (WELL #1)	BEA	ATR Complex - Inside facility fence near northeast corner
108	B21-608 GUN RANGE	BEA	CFA Rifle Range Building B21-608
109	CFA-1603 MANIFOLD	BEA	CFA - Facility center
110	CFA-642 (WELL #2)	BEA	CFA - Facility center
111	CFA-651 (WELL #1)	BEA	CFA - Facility center
112	B27-603 MAIN GATE	BEA	Main Guard Gate
113	PBF-614 (WELL #2)	BEA	CITRC - At PBF Support Area
114	PBF-602 (WELL #1)	BEA	CITRC - At PBF Support Area
115	PBF-638 MANIFOLD	BEA	CITRC - At PBF Support Area
116	EBR-601 WELL	BEA	EBR - At main building
119	TRA-696 WELL	BEA	ATR Complex - Inside facility fence near northeast corner
106	CPP-1767 Sump	CWI	North of INTEC
107	CPP-614	CWI	INTEC - Inside of facility fence
117	WMF-603	CWI	RWMC - In Operations Area
118	WMF-604	CWI	RWMC - In Operations Area
86	Idaho Falls	GSS	Idaho Falls
87	Howe	GSS	Howe (private well) - Near general store

Table A-7. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
88	May 2011 Howe	GSS	Howe - West of town center
89	Mud Lake Well #2 (Control)	GSS	Mud Lake Well #2 (Control) north of State HWY 33
90	Rest Area	GSS	Big Lost River Rest Area on U.S. Highway 20/26
91	Atomic City	GSS	Atomic City - North central end of town south of Taber Rd.
92	Minidoka	GSS	Minidoka
93	Shoshone	GSS	Shoshone
94	Craters of the Moon	GSS	Craters of the Moon

Table A-8. Surface Water Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
630	SDA Lift Station	CWI	RWMC - Inside of the SDA on the south end of ARP V
617	BLR Control (Birch Creek)	GSS	State HWY 22 mile marker 41
618	BLR at EFS	GSS	Experimental Field Station - Northeast of facility fence
619	BLR at NRF	GSS	Lincoln Blvd. bridge northeast of NRF
620	BLR at INTEC	GSS	BLR at INTEC - Just west of Lincoln Blvd. bridge
621	BLR AT Rest Area	GSS	Big Lost River Rest Area on U.S. Highway 20/26
622	Alpheus Springs	GSS	Alpheus Springs
623	Bill Jones Fish Farm	GSS	Bill Jones Fish Farm
624	Clear Spring	GSS	Clear Spring
657	BLR Sinks	GSS	Big Lost River Sinks
625	Big Lost River near Mackay	USGS	Mackay
626	Little Lost River	USGS	Howe
627	Mud Lake	USGS	Terreton - Northeast of State HWY 53 mile marker
628	Big Lost River near Arco	USGS	Arco - 2 miles south of U.S. HWY 20/26 mile marker 251
629	Birch Creek	USGS	Blue Dome - East of State Highway 28 near mile marker 45
631	Big Lost River @ Experimental Field Station	USGS	Experimental Field Station - North of facility fence
632	BLR @ INEL Diversion	USGS	Big Lost River Diversion near USGS gauging station

Table A-9. Soil Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
263	ARA-1	BEA	ARA - North of ARA I & II
264	ARA-14	BEA	ARA - South of ARA I & II
266	ARA-16	BEA	ARA - South of ARA I & II
267	ARA-2	BEA	ARA - North of ARA I & II
268	ARA-24	BEA	ARA - South of ARA I & II
269	ARA-28	BEA	ARA - South of ARA I & II
270	ARA-29	BEA	ARA - South of ARA I & II
272	ARA-31	BEA	ARA - North of ARA I & II
273	ARA-32	BEA	ARA - North of ARA I & II
274	ARA-34	BEA	ARA - North of ARA I & II
275	ARA-38	BEA	ARA - West of ARA I & II
276	ARA-4	BEA	ARA - North of ARA I & II
278	ARA-42	BEA	ARA - West of ARA I & II
279	ARA-43	BEA	ARA - West of ARA I & II
280	ARA-47	BEA	ARA - West of ARA I & II
281	ARA-50	BEA	ARA - West of ARA I & II
282	ARA-51	BEA	ARA - West of ARA I & II
283	ARA-62	BEA	ARA - North of ARA I & II
284	ARA-65	BEA	ARA - North of ARA I & II
285	ARA-71	BEA	ARA - East of ARA I & II
286	ARA-74	BEA	ARA - East of ARA I & II
287	ARA-75	BEA	ARA - East of ARA I & II
288	ARA-77	BEA	ARA - East of ARA I & II
289	ARA-9	BEA	ARA - East of ARA I & II
290	EBR2-1	BEA	MFC - North of facility fence
291	EBR2-10	BEA	MFC - North of facility fence
292	EBR2-11	BEA	MFC - North of facility fence
293	EBR2-12	BEA	MFC - East of facility fence
294	EBR2-13	BEA	MFC - East of facility fence
295	EBR2-15	BEA	MFC - West of facility fence
296	EBR2-16	BEA	MFC - West of facility fence
297	EBR2-17	BEA	MFC - West of facility fence

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
298	EBR2-2	BEA	MFC - South of facility fence
299	EBR2-3	BEA	MFC - East of facility fence
300	EBR2-4	BEA	MFC - East of facility fence
301	EBR2-6	BEA	MFC - North of facility fence
302	TRT-1	BEA	MFC/TREAT - North of facility fence
303	TRT-2	BEA	MFC/TREAT - East of facility fence
304	TRT-3	BEA	MFC/TREAT - West of facility fence
305	TRT-4	BEA	MFC/TREAT - West of facility fence
306	INA-16	BEA	INTEC - East of facility fence
307	INA-17	BEA	INTEC - East of facility fence
308	INA-27	BEA	INTEC - East of facility fence
309	INA-28	BEA	INTEC - East of facility fence
310	INA-4	BEA	INTEC - East of facility fence
311	INA-44	BEA	INTEC - North of facility fence
312	INA-47	BEA	INTEC - North of facility fence
313	INA55	BEA	INTEC - North of facility fence
314	INA58	BEA	INTEC - North of facility fence
315	INA-6	BEA	INTEC - East of facility fence
316	INA-66	BEA	INTEC - North of facility fence
317	INA69	BEA	INTEC - North of facility fence
318	INA-70	BEA	INTEC - North of facility fence
319	INB-101	BEA	INTEC - South of facility fence
320	INB-17	BEA	INTEC - West of facility fence
321	INB-28	BEA	INTEC - West of facility fence
322	INB-29	BEA	INTEC - West of facility fence
323	INB-4	BEA	INTEC - West of facility fence
324	INB-40	BEA	INTEC - West of facility fence
325	INB-50	BEA	INTEC - West of facility fence
326	INB-52	BEA	INTEC - West of facility fence
327	INB71	BEA	ICDF - Inside facility fence
328	INB-80	BEA	ICDF - Inside facility fence
329	INB89	BEA	INTEC - South of facility fence

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
330	INB-90	BEA	INTEC - South of facility fence
331	INB-91	BEA	INTEC - South of facility fence
332	INB-99	BEA	INTEC - South of facility fence
333	INC-15	BEA	INTEC - West of facility fence
334	INC-25	BEA	INTEC - West of facility fence
335	INC-46	BEA	INTEC - North of facility fence
336	INC-48	BEA	INTEC - North of facility fence
337	INC-56	BEA	INTEC - North of facility fence
338	INC-57	BEA	INTEC - North of facility fence
339	IND-56	BEA	INTEC - East of facility fence
340	IND-68	BEA	INTEC - South of facility fence
341	IND-89	BEA	INTEC - South of facility fence
342	IND-91	BEA	INTEC - South of facility fence
343	INT-A15	BEA	INTEC - East of facility fence
344	INT-A38	BEA	INTEC - East of facility fence
345	INT-A39	BEA	INTEC - East of facility fence
346	INT-A49	BEA	INTEC - North of facility fence
347	INT-A50	BEA	INTEC - North of facility fence
348	INT-A59	BEA	INTEC - North of facility fence
349	INT-A61	BEA	INTEC - North of facility fence
350	INT-A72	BEA	INTEC - North of facility fence
351	INT-B102	BEA	INTEC - South of facility fence
352	INT-B103	BEA	INTEC - South of facility fence
353	INT-B104	BEA	INTEC - South of facility fence
354	INT-B106	BEA	INTEC - Southwest of facility fence
355	INT-B14	BEA	INTEC - West of facility fence
357	INT-B15	BEA	INTEC - West of facility fence
358	INT-B25	BEA	INTEC - West of facility fence
359	INT-B3	BEA	INTEC - West of facility fence
360	INT-B48	BEA	INTEC - West of facility fence
362	INT-B61	BEA	INTEC - West of facility fence
363	INT-B62	BEA	INTEC - West of facility fence

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
364	INT-B73	BEA	INTEC - Southwest of facility fence
365	INT-B83	BEA	INTEC - Southwest of facility fence
366	INT-B84	BEA	INTEC - Southwest of facility fence
367	INT-B92	BEA	INTEC - South of facility fence
368	INT-B93	BEA	INTEC - South of facility fence
369	INT-B94	BEA	INTEC - Southwest of facility fence
370	INT-D58	BEA	INTEC - East of facility fence
371	LG-1	BEA	T-Road 8 - East of road (Large Grid)
372	LG-10	BEA	T-Road 9 - North of road (Large Grid)
373	LG-11	BEA	T-Road 22 - Northwest of road (Large Grid)
374	LG-12	BEA	T-Road 22 - Southeast of road (Large Grid)
375	LG-13	BEA	T-Road 4 - East of road ~ 2 miles (Large Grid)
376	LG-14	BEA	T-Road 20 - North of road (Large Grid)
377	LG-15	BEA	U.S. HWY 20 ~ 0.8 miles north of mile marker 282 (Large Grid)
378	LG-16	BEA	U.S. HWY 20 ~ 0.5 miles northwest of mile marker 279 (Large Grid)
379	LG-17	BEA	East Butte - North of butte ~ 1.4 miles (Large Grid)
380	LG-18	BEA	East Butte - South of butte (Large Grid)
381	LG-19	BEA	Middle Butte - Northeast of butte (Large Grid)
382	LG-2	BEA	T-Road 9 - East of road (Large Grid)
383	LG-20	BEA	Atomic City - West of butte ~ 4 miles (Large Grid)
384	LG-21	BEA	Middle Butte - West of butte ~ 1.5 miles (Large Grid)
385	LG-22	BEA	Atomic City - Northwest of city ~ 4 miles (Large Grid)
387	LG-23	BEA	CFA - South of facility and U.S. HWY 20/26 (Large Grid)
388	LG-24	BEA	RWMC - Southeast of facility (Large Grid)
389	LG-25	BEA	RWMC - South of facility fence (Large Grid)
390	LG-26	BEA	ATR Complex - West of facility fence (Large Grid)
391	LG-27	BEA	U.S. HWY 20/26 south of mile marker 260 (Large Grid)
392	LG-28	BEA	U.S. HWY 20/26 east of mile marker 257 (Large Grid)
393	LG-29	BEA	ATR Complex - West of facility fence (Large Grid)
394	LG-3	BEA	RWMC - Northwest of facility fence (Large Grid)

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
395	LG-30	BEA	ATR Complex - North of facility fence (Large Grid)
396	LG-31	BEA	T-Road 17 - East of road (Large Grid)
397	LG-32	BEA	T-Road 3 - North of road (Large Grid)
398	LG-33	BEA	State HWY 33 - Southeast of mile marker 9 (Large Grid)
399	LG-34	BEA	NRF - North of facility fence (Large Grid)
400	LG-35	BEA	Lincoln Blvd. - East of mile maker 14 (Large Grid)
401	LG-36	BEA	T-Road 17 - West of road (Large Grid)
402	LG-37	BEA	T-Road 20 - North of road (Large Grid)
403	LG-38	BEA	T-Road 25 - West of road (Large Grid)
404	LG-39	BEA	T-Road 17 - East of road (Large Grid)
405	LG-4	BEA	T-Road 4 - West of road (Large Grid)
406	LG-40	BEA	Howe - South near the INL Site boundary (Large Grid)
407	LG-41	BEA	Howe - East of town on the INL (Large Grid)
408	LG-42	BEA	State HWY 33 - South of mile marker 26 (Large Grid)
409	LG-43	BEA	Lincoln Blvd. - East of mile maker 19 (Large Grid)
410	LG-44	BEA	State HWY 33 - West of mile marker 29 (Large Grid)
411	LG-45	BEA	T-Road 9 - South of road (Large Grid)
412	LG-46	BEA	T-Road 4 - East of road (Large Grid)
413	LG-47	BEA	U.S. HWY 20/26 northeast mile marker 264 (Large Grid)
414	LG-48	BEA	State HWY 28 - Southeast of mile marker 32 (Large Grid)
415	LG-49	BEA	TAN/IET - North of facility fence (Large Grid)
416	LG-5	BEA	CFA - South near INL Site boundary (Large Grid)
417	LG-50	BEA	NRF - Northwest of facility fence (Large Grid)
418	LG-51	BEA	State HWY 22 - West of mile marker 34 (Large Grid)
419	LG-52	BEA	State HWY 28 - Northeast of mile marker 29 (Large Grid)
420	LG-53	BEA	CFA - Northwest side of sewage treatment lagoon (Large Grid)
421	LG-54	BEA	RWMC - Southwest of facility near T-Road 1 (Large Grid)
422	LG-55	BEA	T-Road 22 - North of road (Large Grid)

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
423	LG-56	BEA	East of ARA near new MFC/CITRC haul road (Large Grid)
424	LG-57	BEA	State HWY 22 - West of mile marker 28 (Large Grid)
425	LG-58	BEA	Atomic City - Northwest of city ~ 1.7 miles (Large Grid)
426	LG-59	BEA	NRF - North of facility fence (Large Grid)
427	LG-6	BEA	Northeast corner of site near farm land (Large Grid)
428	LG-60	BEA	Atomic City - West of butte ~ 2.2 miles (Large Grid)
429	LG-61	BEA	T-Road 4 - (Large Grid)
430	LG-7	BEA	State HWY 28 - West of mile marker 20 (Large Grid)
431	LG-8	BEA	State HWY 28 - West of mile marker 23 (Large Grid)
432	LG-9	BEA	State HWY 33 - North of mile marker 37 (Large Grid)
433	NRF-12	BEA	NRF - West of facility fence
434	NRF-14	BEA	NRF - South of facility fence
435	NRF-6	BEA	NRF - East of facility fence
436	NRF-7	BEA	NRF - North of facility fence
437	NRF-8	BEA	NRF - North of facility fence
438	PBF-1	BEA	CITRC - At PBF Support Area
439	PBF-10	BEA	CITRC - South of PBF Support Area on perimeter fence
440	PBF-11	BEA	CITRC - West of PBF Support Area on perimeter fence
441	PBF-2	BEA	CITRC - West of PBF Control Area on perimeter fence
442	PBF-3	BEA	CITRC - West of PBF Control Area on perimeter fence
443	PBF-5	BEA	CITRC - North of PBF Control Area on perimeter fence
444	PBF-6	BEA	CITRC - North of PBF Control Area on perimeter fence
445	PBF-7	BEA	CITRC - North of Special Programs Facility on perimeter fence
446	PBF-8	BEA	CITRC - East of Incident Response Training and Testing Center on perimeter fence
447	PBF-9	BEA	CITRC - South near perimeter fence along Wilson Blvd.
448	WERF800A	BEA	CITRC - East of Incident Response Training and Testing Center on perimeter fence
449	WERF800B	BEA	CITRC - East of Incident Response Training and Testing Center on perimeter fence

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
450	WERF800C	BEA	CITRC - East of Incident Response Training and Testing Center on perimeter fence
451	WERF800D	BEA	CITRC - East of Incident Response Training and Testing Center on perimeter fence
452	WERF800E	BEA	CITRC - East of Incident Response Training and Testing Center on perimeter fence
453	RW10-1	BEA	EBR-I - West of facility fence
454	RW2-1	BEA	RWMC - North of facility fence
455	RW2-4	BEA	RWMC - North of facility fence
456	RW2-6	BEA	RWMC - North of facility fence
457	RW2-8	BEA	RWMC - North of facility fence
458	RW3-4	BEA	RWMC - North of facility fence
459	RW3-6	BEA	RWMC - North of facility fence
460	RW3-8	BEA	RWMC - North of facility fence
461	RW4-1	BEA	RWMC - North of facility fence
462	RW4-5	BEA	RWMC - North of facility fence
463	RW5-12	BEA	RWMC - North of facility fence
464	RW5-4	BEA	RWMC - North of facility fence
465	RW5-7	BEA	RWMC - North of facility fence
466	RW6-1	BEA	RWMC - South of facility fence
467	RW6-3	BEA	RWMC - South of facility fence
468	RW6-7	BEA	RWMC - West of facility fence
469	RW7-2	BEA	RWMC - South of facility fence
470	RW8-1	BEA	RWMC - South of facility fence
471	RW8-5	BEA	RWMC - West of facility fence
472	RW9-1	BEA	INTEC - Southwest of facility fence
473	RTC8-2	BEA	ATR Complex - South of facility fence
474	TRA.0.3	BEA	ATR Complex - East of facility fence
475	TRA.-1.1	BEA	ATR Complex - East of facility fence
476	TRA.-1.2	BEA	ATR Complex - East of facility fence
477	TRA.1.3	BEA	ATR Complex - East of facility fence
478	TRA.-1.3	BEA	ATR Complex - East of facility fence
479	TRA.1.4	BEA	ATR Complex - East of facility fence

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
480	TRA.-2.2	BEA	ATR Complex - East of facility fence
481	TRA.2.3	BEA	ATR Complex - East of facility fence
482	TRA.-2.3	BEA	ATR Complex - East of facility fence
483	TRA-6.4	BEA	ATR Complex - South of facility fence
484	TRA6-2	BEA	ATR Complex - South of facility fence
485	TRA-A1.2	BEA	ATR Complex - East of facility fence
486	TRA-A1.3	BEA	ATR Complex - North of facility fence
487	TRA-A2.2	BEA	ATR Complex - East of facility fence
488	TRA-A2.3	BEA	ATR Complex - North of facility fence
490	TRA-A2.4	BEA	ATR Complex - North of facility fence
491	TRA-A3.2	BEA	ATR Complex - North of facility fence
492	TRA-A3.4	BEA	ATR Complex - North of facility fence
493	TRA-A3.5	BEA	ATR Complex - North of facility fence
494	TRA-A4.5	BEA	ATR Complex - North of facility fence
495	WRTF-5	BEA	TAN/WRRTF - northeast perimeter fence
496	WRTF-6	BEA	TAN/WRRTF - southeast perimeter fence
497	WRTF-7	BEA	TAN/WRRTF - southwest perimeter fence
498	WRTF-8	BEA	TAN/WRRTF - northwest perimeter fence
499	L2-76	BEA	TAN/SMC - North of facility fence (Large Grid)
500	L3-76	BEA	TAN/SMC - South of facility fence (Large Grid)
501	L4-76	BEA	TAN/SMC - South of facility fence (Large Grid)
502	L5-76	BEA	TAN/SMC - South of facility fence (Large Grid)
503	TSF7	BEA	TAN/TSF - South facility fence
504	TAN-1	BEA	TAN/TSF - South facility fence
505	TAN-6	BEA	TAN/TSF - South facility fence
506	TAN-8	BEA	TAN/TSF - South facility fence
507	TAN-9	BEA	TAN/TSF - South facility fence
508	IET-6	BEA	TAN/IET - East of facility fence
509	IET-7	BEA	TAN/IET - East of facility fence
510	IET-8	BEA	TAN/IET - North of facility fence (Large Grid)
511	IET-9	BEA	TAN/IET - North of facility fence (Large Grid)
512	1-1	CWI	RWMC/TSA - AMWTP facility area

Table A-9. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
513	1-2	CWI	RWMC/SDA - Inside facility fence
514	2-1	CWI	RWMC/SDA - Inside facility fence
515	2-3	CWI	RWMC/SDA - Inside facility fence
516	2-4	CWI	RWMC/SDA - Inside facility fence
517	2-5	CWI	RWMC/SDA - Inside facility fence
518	3-1	CWI	RWMC/SDA - Inside facility fence
519	3-2	CWI	RWMC/SDA - Inside facility fence
520	3-3	CWI	RWMC/SDA - Inside facility fence
521	5-4	CWI	RWMC/TSA - AMWTP facility area
522	3-5	CWI	RWMC/SDA - Inside facility fence
523	T-12	CWI	U.S. HWY 20/26 west of mile marker 266 on T-Road 12
524	T-13	CWI	Spreading Area B (north end)
525	Atomic City	GSS	Near Atomic City on T-4 0.7 miles east of U.S. 26
526	Butte City	GSS	Butte City - 1.3 miles south of mile post 252
527	Frenchman's Cabin	GSS	Frenchman's Cabin
528	FAA Tower	GSS	FAA Tower - US HWY 20 west of mile marker 282
529	Howe	GSS	Howe - just north of mile marker 10.3 on State HWY 33 east of Howe
530	Reno Ranch	GSS	Reno Ranch - 0.3 miles north of mile marker 40 on State HWY 22
531	Monteview	GSS	Monteview
532	Mudlake #1	GSS	Mud Lake - 0.3 miles north of mile marker 16 on State HWY 28
533	Mudlake #2	GSS	Mud Lake - 4.2 miles south of mile marker 44 on State HWY 33
534	Carey	GSS	Carey
535	St. Anthony	GSS	St. Anthony
536	Crystal Ice Caves	GSS	Crystal Ice Caves
537	Blackfoot	GSS	Blackfoot

Table A-10. Biota Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
683	Area 1	CWI	RWMC/SDA - Inside facility fence
684	Area 1	CWI	RWMC/SDA - Inside facility fence
685	Area 1	CWI	RWMC/SDA - Inside facility fence
686	Area 3	CWI	RWMC/SDA - Inside facility fence
687	Area 3	CWI	RWMC/SDA - Inside facility fence
688	Area 3	CWI	RWMC/SDA - Inside facility fence
689	Area 2	CWI	RWMC/SDA - Pad A
690	Area 2	CWI	RWMC/SDA - Pad A
691	Area 2	CWI	RWMC/SDA - Pad A
692	Frenchmans Cabin	CWI	Big Southern Butte - North end of the runway at Frenchman's Cabin
693	Frenchmans Cabin	CWI	Big Southern Butte - North end of the runway at Frenchman's Cabin
694	Frenchmans Cabin	CWI	Big Southern Butte - North end of the runway at Frenchman's Cabin
695	Frenchmans Cabin	CWI	Big Southern Butte - North end of the runway at Frenchman's Cabin
696	Frenchmans Cabin	CWI	Big Southern Butte - North end of the runway at Frenchman's Cabin
697	Frenchmans Cabin	CWI	Big Southern Butte - North end of the runway at Frenchman's Cabin

Table A-11. Agricultural Products Surveillance Locations.

EMP_REF_ID	LOC_NAME	MEDIA	CON_ID	LOCATION DESCRIPTION
664	Terreton	Alfalfa	GSS	Mud Lake - Southwest Corner of N 1200 East & State 33
4	Monteview	Lettuce	GSS	Monteview - Near intersection of E 2700 North & N 800 East
5	Howe	Lettuce	GSS	State HWY 33 mile marker 22
8	FAA Tower	Lettuce	GSS	FAA Tower - U.S. HWY 20 west of mile marker 282
9	EFS	Lettuce	GSS	Experimental Field Station - West of facility fence
11	Arco	Lettuce	GSS	Arco - NOAA tower 0.5 miles south of U.S. HWY 20/26 mile marker 249
14	Atomic City	Lettuce	GSS	Atomic City at NOAA tower
17	Blackfoot	Lettuce	GSS	Blackfoot
18	Carey	Lettuce	GSS	Carey
1	Idaho Falls (Reed's Dairy)	Milk	GSS	Idaho Falls - Reed's Dairy
16	Astle Dairy	Milk	GSS	Astle Dairy
19	Fort Hall	Milk	GSS	Fort Hall
21	Minidoka	Milk	GSS	Minidoka
31	Terreton	Milk	GSS	Terreton
665	Terreton	Milk	GSS	Mud Lake - 0.3 miles East of N 1200 East on E 1700 North
699	Howe	Milk	GSS	Callister Dairy north of Howe
700	Blackfoot	Milk	GSS	Groneman Dairy in Blackfoot
3	Idaho Falls	Potato	GSS	Idaho Falls
6	Mud Lake	Potato	GSS	Mud Lake - south of State HWY 33 on N 1100 East
10	Butte City	Potato	GSS	Butte City - Southwest of U.S. HWY 20/26 mile marker 253
13	Arco	Potato	GSS	South of Arco on U.S. 93
20	Groveland	Potato	GSS	Groveland
23	Monteview	Potato	GSS	Monteview - E 2700 North
26	Rupert	Potato	GSS	Rupert
28	Shelley	Potato	GSS	Shelley
30	Terreton	Potato	GSS	Terreton

Table A-11. (continued).

EMP_REF_ID	LOC_NAME	MEDIA	CON_ID	LOCATION DESCRIPTION
2	Idaho Falls	Wheat	GSS	Idaho Falls
7	Terreton	Wheat	GSS	Terreton - State HWY 33 east of mile marker 47
12	Arco	Wheat	GSS	Arco - West of U.S. HWY 20/26 mile marker 249
15	American Falls	Wheat	GSS	American Falls
22	Monteview	Wheat	GSS	Monteview
24	Moreland	Wheat	GSS	Moreland
25	Rupert	Wheat	GSS	Rupert
27	Rupert	Wheat	GSS	Rupert
29	Taber	Wheat	GSS	Taber

Table A-12. External Radiation Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
152	Hwy28 N2300 O-2	BEA	State Highway 28 - 0.3 miles north of mile marker 27
153	Hwy22 T28 O-1	BEA	State Highway 22 - 0.2 miles north of mile post 33
154	IDAHO FALLS O-10	BEA	Idaho Falls - North of TSA/TSB on east side of Foote Dr.
155	Idaho Falls IF-627 O-30	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility near Building IF-627
156	Idaho Falls IF-675E O-35	BEA	Idaho Falls - PINS Laboratory located east of Hitt Rd. on E 14th N
157	Idaho Falls IF-675D O-33	BEA	Idaho Falls - PINS Laboratory located east of Hitt Rd. on E 14th N
158	Idaho Falls IF-675S O-34	BEA	Idaho Falls - PINS Laboratory located east of Hitt Rd. on E 14th N
159	Idaho Falls IF-675W O-35	BEA	Idaho Falls - PINS Laboratory located east of Hitt Rd. on E 14th N
160	ATOMIC CITY O-2	BEA	Atomic City at NOAA tower
161	TAN LOFT O-7	BEA	TAN - East of SMC facility fence
162	TAN LOFT O-6	BEA	TAN - South of SMC facility fence
163	Hwy33 T17 O-3	BEA	State HWY 33 - mile marker 36
164	LINCOLNBVLD O-25	BEA	TAN - South of TSF facility on State Highway 33 (Lincoln Blvd.)
165	NRF O-20	BEA	NRF - South of facility
166	NRF O-19	BEA	NRF - South of facility
167	NRF O-16	BEA	NRF - North of facility
168	NRF O-5	BEA	NRF - North of facility
169	NRF O-4	BEA	NRF - North of facility
170	NRF O-12	BEA	NRF - East of facility
171	LINCOLNBVLD O-9	BEA	Lincoln Blvd. mile marker 9 - east side of road
172	LINCOLNBVLD O-5	BEA	Lincoln Blvd. mile marker 5 - east side of road
173	TRA O-13	BEA	ATR - West of facility
174	TRA O-11	BEA	ATR - West of facility
175	TRA O-10	BEA	ATR Complex - North of facility

Table A-12. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
176	TRA O-8	BEA	ATR - North of facility
177	TRA O-6	BEA	ATR - Northeast of facility
178	TRA O-4	BEA	ATR - East of facility
179	TRA O-2	BEA	ATR -South of facility
180	ICPP O-19	BEA	INTEC - West of facility
181	ICPP TREEFARM O-3	BEA	INTEC - West of facility
182	ICPP O-21	BEA	INTEC - Southwest of facility
183	ICPP O-23	BEA	INTEC - Southeast of facility
184	ICPP O-25	BEA	INTEC - Southeast of facility
185	ICPP O-26	BEA	INTEC - East of facility
186	ICPP O-15	BEA	INTEC - Northeast of facility
187	ICPP O-9	BEA	INTEC - Northeast of facility
188	ICPP O-17	BEA	INTEC - Northwest of facility
189	LINCOLNBVLD O-3	BEA	Lincoln Blvd. south of ICDF - East side of road
190	CFA O-1	BEA	CFA - West of Building 690
191	LINCOLNBLVD O-1	BEA	CFA - East of Lincoln BLVD. near Main St. intersection
192	PBF SPERT O-1	BEA	CITRC - North of Jefferson Rd. and PBF-632 at the former PBF Control Area
193	ARA I&II O-1	BEA	ARA - ARA I & II facility location
194	Hwy20 Mile O-276	BEA	US HWY 20 and the intersection of Taylor Blvd. on the east side of the road.
195	ANL W EBR II O-13	BEA	MFC - Southeast of perimeter fence
196	ANL W EBR II O-12	BEA	MFC - West of perimeter fence near guard gate
197	ANL W EBR II O-7	BEA	MFC - West of perimeter fence
198	ANL W EBR II O-18	BEA	MFC - West of perimeter fence
199	ANL W EBR II O-17	BEA	MFC - North of perimeter fence
200	ANL W EBR II O-15	BEA	MFC - Northeast of perimeter fence
201	ANL W TREAT O-9	BEA	MFC - North of MFC-721
202	EBR I O-1	BEA	EBR-I - Parking lot
203	RWMC O-46	BEA	RWMC - North of Operation Area facility fence

Table A-12. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
204	RWMC O-9A	BEA	RWMC - North of SDA facility fence near north gate
205	RWMC O-13A	BEA	RWMC - North of SDA facility fence
206	RWMC O-17A	BEA	RWMC - West of facility fence
207	RWMC O-21A	BEA	RWMC - South of SDA facility fence
208	RWMC O-25A	BEA	RWMC - South of SDA facility fence
209	RWMC O-29A	BEA	RWMC - South of SDA facility fence
210	RWMC O-43	BEA	RWMC - South of TSA facility fence
211	RWMC O-41	BEA	RWMC - East of TSA facility fence
212	RWMC O-39	BEA	RWMC - East of facility fence near main gate
213	REXBURG O-12	BEA	Rexburg - East of Yellowstone Highway on W 7th St. S
633	ARCO O-1	BEA	Arco - NOAA tower 0.5 miles south of U.S. HWY 20/26 mile marker 249
637	HOWE O-3	BEA	Howe
638	001	BEA	Howe
640	CRATERS of Moon O-7	BEA	Craters of the Moon
642	BLACKFOOT O-9	BEA	Blackfoot - Mountain View Middle School
647	ABERDEEN O-8	BEA	Aberdeen
648	MINIDOKA O-11	BEA	Minidoka
649	RENO RANCH O-6	BEA	Reno Ranch - State HWY 22 mile marker 41
650	ROBERTS O-13	BEA	Roberts
651	MONTEVIEW O-4	BEA	Monteview - Near intersection of E 2700 North & N 800 East
652	MUD LAKE O-5	BEA	Mud Lake - South of State HWY 33 on N 1100 East
668	IF-603W O-4	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, west of Building IF-603
669	IF-603N O-1	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, north of Building IF-603

Table A-12. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
670	IF-603E O-2	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, east of Building IF-603
671	IF-603S O-3	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, south of Building IF-603
672	IF-638N O-1	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, north of Building IF-638
673	IF-638W O-4	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, west of Building IF-638
674	IF-638S O-3	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, south of Building IF-638
675	IF-638E O-2	BEA	Idaho Falls - Located at the INL Research Center (IRC) facility, east of Building IF-638
680	VanB O-1	BEA	Van Buren Blvd just north of U.S. Highway 20/26
682	EFS O-1	BEA	Experimental Field Station - West of facility fence
136	Reno Ranch	GSS	Reno Ranch - State HWY 22 mile marker 41
137	Blue Dome	GSS	Blue Dome
138	Craters of Moon	GSS	Craters of the Moon
139	Atomic City	GSS	US HWY 26 - South of mile marker 278
140	Blackfoot	GSS	Blackfoot
141	Aberdeen	GSS	Aberdeen
142	Minidoka	GSS	Minidoka
143	Roberts	GSS	Roberts
144	Idaho Falls	GSS	Idaho Falls - North of TSA/TSB on east side of Foote Dr.
145	Monteview	GSS	Monteview - Near intersection of E 2700 North & N 800 East
146	DuBois	GSS	DuBois
147	Howe	GSS	Howe

Table A-12. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
149	Arco	GSS	Arco - NOAA tower 0.5 miles south of U.S. HWY 20/26 mile marker 249
150	Mountain View Middle School	GSS	Blackfoot - Mountain View Middle School
151	Jackson Hole	GSS	Jackson Hole
659	Rexburg	GSS	Rexburg - Behind Madison Middle School
662	Sugar City	GSS	Sugar City
681	Main Gate O-1	GSS	Main Guard Gate

Table A-13. Flora and Fauna Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
80	Industrial Waste Pond (IWP)	GSS	MFC - Industrial Waste Pond
81	Sanitary Sewage Lagoons	GSS	MFC -SW Sanitary Sewage Lagoon Pond (MFC-779)
82	Sewage Lagoons	GSS	ATR Complex - Main Sewage Lagoon TRA-736
83	Sewage Treatment Lagoons	GSS	INTEC - Cell 2 at Sewage Treatment Lagoons
84	New Percolation Ponds	GSS	VZRP - South of new INTEC Percolation Ponds

Table A-14. Long-Term Vegetation (GSS).

PLOT	MEDIA	PLOT	MEDIA
1	Long-term vegetation plot	48	Long-term vegetation plot
2	Long-term vegetation plot	49	Long-term vegetation plot
3	Long-term vegetation plot	50	Long-term vegetation plot
4	Long-term vegetation plot	51	Long-term vegetation plot
5	Long-term vegetation plot	52	Long-term vegetation plot
6	Long-term vegetation plot	53	Long-term vegetation plot
7	Long-term vegetation plot	54	Long-term vegetation plot
8	Long-term vegetation plot	55	Long-term vegetation plot
9	Long-term vegetation plot	56	Long-term vegetation plot
10	Long-term vegetation plot	57	Long-term vegetation plot
11	Long-term vegetation plot	66	Long-term vegetation plot
13	Long-term vegetation plot	67	Long-term vegetation plot
14	Long-term vegetation plot	68	Long-term vegetation plot
15	Long-term vegetation plot	69	Long-term vegetation plot
17	Long-term vegetation plot	70	Long-term vegetation plot
18	Long-term vegetation plot	71	Long-term vegetation plot
19	Long-term vegetation plot	72	Long-term vegetation plot
20	Long-term vegetation plot	73	Long-term vegetation plot
21	Long-term vegetation plot	74	Long-term vegetation plot
22	Long-term vegetation plot	75	Long-term vegetation plot
23	Long-term vegetation plot	76	Long-term vegetation plot
24	Long-term vegetation plot	77	Long-term vegetation plot
25	Long-term vegetation plot	78	Long-term vegetation plot
26	Long-term vegetation plot	79	Long-term vegetation plot
27	Long-term vegetation plot	80	Long-term vegetation plot
28	Long-term vegetation plot	81	Long-term vegetation plot
29	Long-term vegetation plot	82	Long-term vegetation plot
30	Long-term vegetation plot	83	Long-term vegetation plot
31	Long-term vegetation plot	84	Long-term vegetation plot
32	Long-term vegetation plot	85	Long-term vegetation plot
33	Long-term vegetation plot	86	Long-term vegetation plot

Table A-14. (continued).

PLOT	MEDIA	PLOT	MEDIA
34	Long-term vegetation plot	87	Long-term vegetation plot
35	Long-term vegetation plot	88	Long-term vegetation plot
36	Long-term vegetation plot	89	Long-term vegetation plot
37	Long-term vegetation plot	90	Long-term vegetation plot
38	Long-term vegetation plot	91	Long-term vegetation plot
39	Long-term vegetation plot	92	Long-term vegetation plot
40	Long-term vegetation plot	93	Long-term vegetation plot
41	Long-term vegetation plot	94	Long-term vegetation plot
42	Long-term vegetation plot	95	Long-term vegetation plot
43	Long-term vegetation plot	96	Long-term vegetation plot
44	Long-term vegetation plot	97	Long-term vegetation plot
45	Long-term vegetation plot	98	Long-term vegetation plot
46	Long-term vegetation plot	99	Long-term vegetation plot
47	Long-term vegetation plot		

Table A-15. Breeding Bird Routes (GSS).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
1	a	TWIN BUTTES	USGS
2	a	TWIN BUTTES	USGS
3	a	TWIN BUTTES	USGS
4	a	TWIN BUTTES	USGS
5	a	TWIN BUTTES	USGS
6	a	TWIN BUTTES	USGS
7	a	TWIN BUTTES	USGS
8	a	TWIN BUTTES	USGS
9	a	TWIN BUTTES	USGS
10	a	TWIN BUTTES	USGS
11	a	TWIN BUTTES	USGS
12	a	TWIN BUTTES	USGS
13	a	TWIN BUTTES	USGS
14	a	TWIN BUTTES	USGS
15	a	TWIN BUTTES	USGS
16	a	TWIN BUTTES	USGS
17	a	TWIN BUTTES	USGS
18	a	TWIN BUTTES	USGS
19	a	TWIN BUTTES	USGS
20	a	TWIN BUTTES	USGS
21	a	TWIN BUTTES	USGS
22	a	TWIN BUTTES	USGS
23	a	TWIN BUTTES	USGS
24	a	TWIN BUTTES	USGS
25	a	TWIN BUTTES	USGS
26	a	TWIN BUTTES	USGS
27	a	TWIN BUTTES	USGS
28	a	TWIN BUTTES	USGS
29	a	TWIN BUTTES	USGS
30	a	TWIN BUTTES	USGS
31	a	TWIN BUTTES	USGS

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
32	a	TWIN BUTTES	USGS
33	a	TWIN BUTTES	USGS
34	a	TWIN BUTTES	USGS
35	a	TWIN BUTTES	USGS
36	a	TWIN BUTTES	USGS
37	a	TWIN BUTTES	USGS
38	a	TWIN BUTTES	USGS
39	a	TWIN BUTTES	USGS
40	a	TWIN BUTTES	USGS
41	a	TWIN BUTTES	USGS
42	a	TWIN BUTTES	USGS
43	a	TWIN BUTTES	USGS
44	a	TWIN BUTTES	USGS
45	a	TWIN BUTTES	USGS
46	a	TWIN BUTTES	USGS
47	a	TWIN BUTTES	USGS
48	a	TWIN BUTTES	USGS
49	a	TWIN BUTTES	USGS
50	a	TWIN BUTTES	USGS
1	b	LOST RIVER	USGS
2	b	LOST RIVER	USGS
3	b	LOST RIVER	USGS
4	b	LOST RIVER	USGS
5	b	LOST RIVER	USGS
6	b	LOST RIVER	USGS
7	b	LOST RIVER	USGS
8	b	LOST RIVER	USGS
9	b	LOST RIVER	USGS
10	b	LOST RIVER	USGS
11	b	LOST RIVER	USGS
12	b	LOST RIVER	USGS
13	b	LOST RIVER	USGS

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
14	b	LOST RIVER	USGS
15	b	LOST RIVER	USGS
16	b	LOST RIVER	USGS
17	b	LOST RIVER	USGS
18	b	LOST RIVER	USGS
19	b	LOST RIVER	USGS
20	b	LOST RIVER	USGS
21	b	LOST RIVER	USGS
22	b	LOST RIVER	USGS
23	b	LOST RIVER	USGS
24	b	LOST RIVER	USGS
25	b	LOST RIVER	USGS
26	b	LOST RIVER	USGS
27	b	LOST RIVER	USGS
28	b	LOST RIVER	USGS
29	b	LOST RIVER	USGS
30	b	LOST RIVER	USGS
31	b	LOST RIVER	USGS
32	b	LOST RIVER	USGS
33	b	LOST RIVER	USGS
34	b	LOST RIVER	USGS
35	b	LOST RIVER	USGS
36	b	LOST RIVER	USGS
37	b	LOST RIVER	USGS
38	b	LOST RIVER	USGS
39	b	LOST RIVER	USGS
40	b	LOST RIVER	USGS
41	b	LOST RIVER	USGS
42	b	LOST RIVER	USGS
43	b	LOST RIVER	USGS
44	b	LOST RIVER	USGS
45	b	LOST RIVER	USGS

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
46	b	LOST RIVER	USGS
47	b	LOST RIVER	USGS
48	b	LOST RIVER	USGS
49	b	LOST RIVER	USGS
50	b	LOST RIVER	USGS
1	c	KYLE CANYON	USGS
2	c	KYLE CANYON	USGS
3	c	KYLE CANYON	USGS
4	c	KYLE CANYON	USGS
5	c	KYLE CANYON	USGS
6	c	KYLE CANYON	USGS
7	c	KYLE CANYON	USGS
8	c	KYLE CANYON	USGS
9	c	KYLE CANYON	USGS
10	c	KYLE CANYON	USGS
11	c	KYLE CANYON	USGS
12	c	KYLE CANYON	USGS
13	c	KYLE CANYON	USGS
14	c	KYLE CANYON	USGS
15	c	KYLE CANYON	USGS
16	c	KYLE CANYON	USGS
17	c	KYLE CANYON	USGS
18	c	KYLE CANYON	USGS
19	c	KYLE CANYON	USGS
20	c	KYLE CANYON	USGS
21	c	KYLE CANYON	USGS
22	c	KYLE CANYON	USGS
23	c	KYLE CANYON	USGS
24	c	KYLE CANYON	USGS
25	c	KYLE CANYON	USGS
26	c	KYLE CANYON	USGS
27	c	KYLE CANYON	USGS

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
28	c	KYLE CANYON	USGS
29	c	KYLE CANYON	USGS
30	c	KYLE CANYON	USGS
31	c	KYLE CANYON	USGS
32	c	KYLE CANYON	USGS
33	c	KYLE CANYON	USGS
34	c	KYLE CANYON	USGS
35	c	KYLE CANYON	USGS
36	c	KYLE CANYON	USGS
37	c	KYLE CANYON	USGS
38	c	KYLE CANYON	USGS
39	c	KYLE CANYON	USGS
40	c	KYLE CANYON	USGS
41	c	KYLE CANYON	USGS
42	c	KYLE CANYON	USGS
43	c	KYLE CANYON	USGS
44	c	KYLE CANYON	USGS
45	c	KYLE CANYON	USGS
46	c	KYLE CANYON	USGS
47	c	KYLE CANYON	USGS
48	c	KYLE CANYON	USGS
49	c	KYLE CANYON	USGS
50	c	KYLE CANYON	USGS
1	d	CIRCULAR BUTTE	USGS
2	d	CIRCULAR BUTTE	USGS
3	d	CIRCULAR BUTTE	USGS
4	d	CIRCULAR BUTTE	USGS
5	d	CIRCULAR BUTTE	USGS
6	d	CIRCULAR BUTTE	USGS
7	d	CIRCULAR BUTTE	USGS
8	d	CIRCULAR BUTTE	USGS
9	d	CIRCULAR BUTTE	USGS

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
10	d	CIRCULAR BUTTE	USGS
11	d	CIRCULAR BUTTE	USGS
12	d	CIRCULAR BUTTE	USGS
13	d	CIRCULAR BUTTE	USGS
14	d	CIRCULAR BUTTE	USGS
15	d	CIRCULAR BUTTE	USGS
16	d	CIRCULAR BUTTE	USGS
17	d	CIRCULAR BUTTE	USGS
18	d	CIRCULAR BUTTE	USGS
19	d	CIRCULAR BUTTE	USGS
20	d	CIRCULAR BUTTE	USGS
21	d	CIRCULAR BUTTE	USGS
22	d	CIRCULAR BUTTE	USGS
23	d	CIRCULAR BUTTE	USGS
24	d	CIRCULAR BUTTE	USGS
25	d	CIRCULAR BUTTE	USGS
26	d	CIRCULAR BUTTE	USGS
27	d	CIRCULAR BUTTE	USGS
28	d	CIRCULAR BUTTE	USGS
29	d	CIRCULAR BUTTE	USGS
30	d	CIRCULAR BUTTE	USGS
31	d	CIRCULAR BUTTE	USGS
32	d	CIRCULAR BUTTE	USGS
33	d	CIRCULAR BUTTE	USGS
34	d	CIRCULAR BUTTE	USGS
35	d	CIRCULAR BUTTE	USGS
36	d	CIRCULAR BUTTE	USGS
37	d	CIRCULAR BUTTE	USGS
38	d	CIRCULAR BUTTE	USGS
39	d	CIRCULAR BUTTE	USGS
40	d	CIRCULAR BUTTE	USGS
41	d	CIRCULAR BUTTE	USGS

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
42	d	CIRCULAR BUTTE	USGS
43	d	CIRCULAR BUTTE	USGS
44	d	CIRCULAR BUTTE	USGS
45	d	CIRCULAR BUTTE	USGS
46	d	CIRCULAR BUTTE	USGS
47	d	CIRCULAR BUTTE	USGS
48	d	CIRCULAR BUTTE	USGS
49	d	CIRCULAR BUTTE	USGS
50	d	CIRCULAR BUTTE	USGS
1	e	TRACTOR FLATS	USGS
2	e	TRACTOR FLATS	USGS
3	e	TRACTOR FLATS	USGS
4	e	TRACTOR FLATS	USGS
5	e	TRACTOR FLATS	USGS
6	e	TRACTOR FLATS	USGS
7	e	TRACTOR FLATS	USGS
8	e	TRACTOR FLATS	USGS
9	e	TRACTOR FLATS	USGS
10	e	TRACTOR FLATS	USGS
11	e	TRACTOR FLATS	USGS
12	e	TRACTOR FLATS	USGS
13	e	TRACTOR FLATS	USGS
14	e	TRACTOR FLATS	USGS
15	e	TRACTOR FLATS	USGS
16	e	TRACTOR FLATS	USGS
17	e	TRACTOR FLATS	USGS
18	e	TRACTOR FLATS	USGS
19	e	TRACTOR FLATS	USGS
20	e	TRACTOR FLATS	USGS
21	e	TRACTOR FLATS	USGS
22	e	TRACTOR FLATS	USGS
23	e	TRACTOR FLATS	USGS

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
24	e	TRACTOR FLATS	USGS
25	e	TRACTOR FLATS	USGS
26	e	TRACTOR FLATS	USGS
27	e	TRACTOR FLATS	USGS
28	e	TRACTOR FLATS	USGS
29	e	TRACTOR FLATS	USGS
30	e	TRACTOR FLATS	USGS
31	e	TRACTOR FLATS	USGS
32	e	TRACTOR FLATS	USGS
33	e	TRACTOR FLATS	USGS
34	e	TRACTOR FLATS	USGS
35	e	TRACTOR FLATS	USGS
36	e	TRACTOR FLATS	USGS
37	e	TRACTOR FLATS	USGS
38	e	TRACTOR FLATS	USGS
39	e	TRACTOR FLATS	USGS
40	e	TRACTOR FLATS	USGS
41	e	TRACTOR FLATS	USGS
42	e	TRACTOR FLATS	USGS
43	e	TRACTOR FLATS	USGS
44	e	TRACTOR FLATS	USGS
45	e	TRACTOR FLATS	USGS
46	e	TRACTOR FLATS	USGS
47	e	TRACTOR FLATS	USGS
48	e	TRACTOR FLATS	USGS
49	e	TRACTOR FLATS	USGS
50	e	TRACTOR FLATS	USGS
1	f	INTEC	Facility
2	f	INTEC	Facility
3	f	INTEC	Facility
4	f	INTEC	Facility
5	f	INTEC	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
6	f	INTEC	Facility
7	f	INTEC	Facility
8	f	INTEC	Facility
9	f	INTEC	Facility
10	f	INTEC	Facility
11	f	INTEC	Facility
12	f	INTEC	Facility
13	f	INTEC	Facility
14	f	INTEC	Facility
15	f	INTEC	Facility
16	f	INTEC	Facility
17	f	INTEC	Facility
18	f	INTEC	Facility
19	f	INTEC	Facility
20	f	INTEC	Facility
21	f	INTEC	Facility
22	f	INTEC	Facility
23	f	INTEC	Facility
24	f	INTEC	Facility
25	f	INTEC	Facility
1	g	ATRC	Facility
2	g	ATRC	Facility
3	g	ATRC	Facility
4	g	ATRC	Facility
5	g	ATRC	Facility
6	g	ATRC	Facility
7	g	ATRC	Facility
8	g	ATRC	Facility
9	g	ATRC	Facility
10	g	ATRC	Facility
11	g	ATRC	Facility
12	g	ATRC	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
13	g	ATRC	Facility
14	g	ATRC	Facility
15	g	ATRC	Facility
16	g	ATRC	Facility
17	g	ATRC	Facility
18	g	ATRC	Facility
19	g	ATRC	Facility
20	g	ATRC	Facility
21	g	ATRC	Facility
22	g	ATRC	Facility
23	g	ATRC	Facility
24	g	ATRC	Facility
25	g	ATRC	Facility
26	g	ATRC	Facility
27	g	ATRC	Facility
28	g	ATRC	Facility
29	g	ATRC	Facility
30	g	ATRC	Facility
31	g	ATRC	Facility
32	g	ATRC	Facility
1	h	CFA	Facility
2	h	CFA	Facility
3	h	CFA	Facility
4	h	CFA	Facility
5	h	CFA	Facility
6	h	CFA	Facility
7	h	CFA	Facility
8	h	CFA	Facility
9	h	CFA	Facility
10	h	CFA	Facility
11	h	CFA	Facility
12	h	CFA	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
13	h	CFA	Facility
14	h	CFA	Facility
15	h	CFA	Facility
16	h	CFA	Facility
17	h	CFA	Facility
18	h	CFA	Facility
19	h	CFA	Facility
20	h	CFA	Facility
21	h	CFA	Facility
22	h	CFA	Facility
23	h	CFA	Facility
24	h	CFA	Facility
25	h	CFA	Facility
26	h	CFA	Facility
27	h	CFA	Facility
28	h	CFA	Facility
29	h	CFA	Facility
30	h	CFA	Facility
31	h	CFA	Facility
32	h	CFA	Facility
33	h	CFA	Facility
34	h	CFA	Facility
35	h	CFA	Facility
36	h	CFA	Facility
37	h	CFA	Facility
38	h	CFA	Facility
39	h	CFA	Facility
40	h	CFA	Facility
41	h	CFA	Facility
42	h	CFA	Facility
1	i	NRF	Facility
2	i	NRF	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
3	i	NRF	Facility
4	i	NRF	Facility
5	i	NRF	Facility
6	i	NRF	Facility
7	i	NRF	Facility
8	i	NRF	Facility
9	i	NRF	Facility
10	i	NRF	Facility
11	i	NRF	Facility
12	i	NRF	Facility
13	i	NRF	Facility
14	i	NRF	Facility
15	i	NRF	Facility
16	i	NRF	Facility
17	i	NRF	Facility
18	i	NRF	Facility
19	i	NRF	Facility
20	i	NRF	Facility
1	j	TAN	Facility
2	j	TAN	Facility
3	j	TAN	Facility
4	j	TAN	Facility
5	j	TAN	Facility
6	j	TAN	Facility
7	j	TAN	Facility
8	j	TAN	Facility
9	j	TAN	Facility
10	j	TAN	Facility
11	j	TAN	Facility
12	j	TAN	Facility
13	j	TAN	Facility
14	j	TAN	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
15	j	TAN	Facility
16	j	TAN	Facility
17	j	TAN	Facility
18	j	TAN	Facility
19	j	TAN	Facility
20	j	TAN	Facility
21	j	TAN	Facility
22	j	TAN	Facility
23	j	TAN	Facility
24	j	TAN	Facility
25	j	TAN	Facility
26	j	TAN	Facility
27	j	TAN	Facility
28	j	TAN	Facility
29	j	TAN	Facility
30	j	TAN	Facility
31	j	TAN	Facility
32	j	TAN	Facility
33	j	TAN	Facility
34	j	TAN	Facility
35	j	TAN	Facility
36	j	TAN	Facility
37	j	TAN	Facility
38	j	TAN	Facility
39	j	TAN	Facility
40	j	TAN	Facility
41	j	TAN	Facility
42	j	TAN	Facility
43	j	TAN	Facility
44	j	TAN	Facility
45	j	TAN	Facility
46	j	TAN	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
47	j	TAN	Facility
48	j	TAN	Facility
49	j	TAN	Facility
50	j	TAN	Facility
51	j	TAN	Facility
52	j	TAN	Facility
53	j	TAN	Facility
54	j	TAN	Facility
55	j	TAN	Facility
56	j	TAN	Facility
57	j	TAN	Facility
58	j	TAN	Facility
59	j	TAN	Facility
60	j	TAN	Facility
1	k	CITRC	Facility
2	k	CITRC	Facility
3	k	CITRC	Facility
4	k	CITRC	Facility
5	k	CITRC	Facility
6	k	CITRC	Facility
7	k	CITRC	Facility
8	k	CITRC	Facility
9	k	CITRC	Facility
10	k	CITRC	Facility
11	k	CITRC	Facility
12	k	CITRC	Facility
13	k	CITRC	Facility
14	k	CITRC	Facility
15	k	CITRC	Facility
16	k	CITRC	Facility
17	k	CITRC	Facility
18	k	CITRC	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
19	k	CITRC	Facility
20	k	CITRC	Facility
21	k	CITRC	Facility
22	k	CITRC	Facility
23	k	CITRC	Facility
24	k	CITRC	Facility
25	k	CITRC	Facility
26	k	CITRC	Facility
27	k	CITRC	Facility
28	k	CITRC	Facility
1	l	RWMC	Facility
2	l	RWMC	Facility
3	l	RWMC	Facility
4	l	RWMC	Facility
5	l	RWMC	Facility
6	l	RWMC	Facility
7	l	RWMC	Facility
8	l	RWMC	Facility
9	l	RWMC	Facility
10	l	RWMC	Facility
11	l	RWMC	Facility
12	l	RWMC	Facility
13	l	RWMC	Facility
14	l	RWMC	Facility
15	l	RWMC	Facility
16	l	RWMC	Facility
17	l	RWMC	Facility
18	l	RWMC	Facility
19	l	RWMC	Facility
20	l	RWMC	Facility
1	m	MFC	Facility
2	m	MFC	Facility

Table A-15. (continued).

ID	ROUTE_ID	ROUTE_NAME	ROUTE_TYPE
3	m	MFC	Facility
4	m	MFC	Facility
5	m	MFC	Facility
6	m	MFC	Facility
7	m	MFC	Facility
8	m	MFC	Facility
9	m	MFC	Facility
10	m	MFC	Facility
11	m	MFC	Facility
12	m	MFC	Facility
13	m	MFC	Facility
14	m	MFC	Facility
15	m	MFC	Facility
16	m	MFC	Facility
17	m	MFC	Facility
18	m	MFC	Facility

Table A-16. Precipitation Surveillance Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
262	EFS	GSS	Experimental Field Station - West of facility fence
653	CFA	GSS	CFA north of Building 690
676	Idaho Falls	GSS	Idaho Falls - North of TSA/TSB on east side of Foote Rd.

Table A-17. Meteorological Monitoring Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
225	690	NOAA	CFA north of Building 690
226	ABE	NOAA	Aberdeen
227	ARC	NOAA	Arco - NOAA tower 0.5 miles south of U.S. HWY 20/26 mile marker 249
228	BAS	NOAA	Base of Howe Peak NOAA tower northwest of NRF
229	BIG	NOAA	Southwest of Big Southern Butte ~10 miles (Coxs Well)
230	BLK	NOAA	Blackfoot - Mountain View Middle School
231	BLU	NOAA	Blue Dome
232	CRA	NOAA	Craters of the Moon
233	DEA	NOAA	Dead Man Canyon NOAA tower on T-Road 11
234	DUB	NOAA	Dubois
235	EBR	NOAA	MFC - West side of MFC facility fence
236	FOR	NOAA	Fort Hall
237	GRI	NOAA	INTEC/Grid3 NOAA tower
238	HAM	NOAA	Hamer
239	HOW	NOAA	Howe
240	IDA	NOAA	Idaho Falls south of John's Hole Bridge
241	KET	NOAA	Kettle Butte
242	LOF	NOAA	TAN/SMC - North of SMC facility fence at NOAA tower
243	LOS	NOAA	Big Lost River Rest Area on U.S. Highway 20/26
244	MIN	NOAA	Minidoka
245	MON	NOAA	Monteview - Near intersection of E 2700 North & N 800 East
246	NRF	NOAA	East of NRF
247	PBF	NOAA	CITRC at PBF Support Area
248	PRO	NOAA	0.5 miles northeast of INTEC/Grid 3 NOAA tower
249	RIC	NOAA	Richfield
250	ROB	NOAA	Roberts - at NOAA tower
251	ROV	NOAA	Rover NOAA tower on T-Road 4
252	RWM	NOAA	North of RWMC
254	SAN	NOAA	Sand Dunes NOAA tower - South of Lincoln Blvd. guard gate #4
255	SUG	NOAA	Sugar City

Table A-17. (continued).

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
256	SUM	NOAA	Big Southern Summit
257	TAB	NOAA	Taber
258	TER	NOAA	Terreton - State HWY 33 east of mile marker 47
259	TRA	NOAA	ATR Complex - West of facility fence
654	ATO	NOAA	Atomic City at NOAA tower

Table A-18. Event Monitoring Locations.

EMP_REF_ID	LOC_NAME	CON_ID	LOCATION DESCRIPTION
120	690	BEA	CFA north of Building 690
121	EBR	BEA	MFC - West side of MFC facility fence
122	LOF	BEA	TAN/SMC - North of SMC facility fence at NOAA tower
123	NRF	BEA	East of NRF
124	PBF	BEA	CITRC at PBF Support Area
125	RWM	BEA	North of RWMC
126	GRI	BEA	ATR Complex - West of facility fence
127	ARC	BEA	Arco - NOAA tower 0.5 miles south of U.S. HWY 20/26 mile marker 249
128	ATO	BEA	Atomic City at NOAA tower
129	BLU	BEA	Blue Dome
130	HOW	BEA	Howe
131	KET	BEA	Kettle Butte
132	MON	BEA	Monteview - Near intersection of E 2700 North & N 800 East
133	TER	BEA	Terreton - State HWY 33 east of mile marker 47
134	IDA	BEA	Idaho Falls south of John's Hole Bridge
135	RXB	BEA	Rexburg - Behind Madison Middle School